GE Medical Systems

Technical Publications

2143494–100

Revision 4

Legacy Radiographic & Fluoroscopic System Advantx® Console Screens Operating Manual

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Operating Documentation

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Legacy Radiographic & Fluoroscopic System Advantx® Console Screens Operating Manual

IMPORTANT! . . . X-RAY PROTECTION

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, Medical Systems Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that everyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, Medical Systems Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective material and devices are available. It is urged that such materials or devices be used.

CAUTION: United States Federal law restricts this device to use by or on the order of a physician.

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GENERAL ELECTRIC COMPANY MEDICAL SYSTEMS

MANAGER – INFORMATION INTEGRATION,
AMERICAS W–622
P.O. BOX 414
MILWAUKEE, WI 53201–0414

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing shall be performed by qualified GE Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14** day period.

Call Traffic and Transportation, Milwaukee, WI (414) 827–3449 / 8*285–3449 **immediately** after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section "S" of the Policy & Procedure Bulletins.

6/17/94

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SAFETY

WARNING

ELECTRIC SHOCK HAZARD! DO NOT REMOVE COVERS OR PANELS. ADVANTX CONSOLE AND CABINETS CONTAIN HIGH VOLTAGE CIRCUITS FOR GENERATING AND CONTROLLING X−RAYS. PREVENT POSSIBLE ELECTRIC SHOCK BY LEAVING COVERS OR PANELS ON THE EQUIPMENT. THERE ARE NO OPERATOR SERVICEABLE PARTS OR ADJUSTMENTS INSIDE THE CABINETS. ONLY TRAINED AND QUALIFIED PERSONNEL SHOULD BE PERMITTED ACCESS TO THE INTERNAL PARTS OF THIS EQUIPMENT.

CAUTION

The Advantx Console must be kept as vertical as possible to prevent over heating which could damage the console. Do not lay the console flat. Do not lay any object on the console that could restrict air flow through the console.

Advantx contains operating safeguards to provide maximum safety. Before calling for service, be certain proper operating procedures are being used.

Satisfactory equipment performance requires the use of service personnel specially trained on x−ray apparatus. GE Medical Systems is responsible for the effects on safety, reliability, and performance only if the following conditions are met:

- The electrical wiring of the relevant rooms complies with the *Regulations for the electrical equipment of buildings* published by the Institution of Electrical Engineers as well as all national and local codes.
- All assembly operations, extensions, re−adjustments, modifications or repairs are carried out by GE Medical Systems' authorized service representatives.
- The equipment is used in accordance with the instructions for use.

Know the Equipment

Always be alert to safety when you operate this equipment. You must be familiar enough with the equipment to recognize any malfunctions that can be a hazard. If a malfunction occurs or a safety problem is known to exist, do not use this equipment until qualified personnel correct the problem.

Keep the operating manuals with the equipment at all times and periodically review the procedures and safety precautions.

Equipment Classifications

The following equipment classifications are applicable to the product:

- Equipment classification with respect to protection from electric shock: **Class I**
- Degree of protection from electric shock: **Type B**
- Degree of protection against ingress of liquids: **not classified**
- Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air or with nitrous oxide; mode of operation: **continuous**

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Radiation Safety

Always use proper technique factors for each procedure to minimize x-ray exposure and to produce the best diagnostic results. In particular, you must be thoroughly familiar with safety precautions before operating the Advantx System.

Establish Emergency Procedures

It is not always possible to determine when some components, such as x−ray tubes, are nearing the end of their operating lives. These components could stop operating during a patient examination.

ESTABLISH PROCEDURES FOR HANDLING THE PATIENT IN CASE OF THE LOSS OF FLUOROSCOPIC IMAGING OR OTHER SYSTEM FUNCTIONS DURING AN EXAM.

Horizontal bars may suddenly appear briefly on the Distar monitor and may cause an image problem. The bars should disappear spontaneously. If the problem persists, call Service.

IF THE DRS KEYBOARD FAILS TO RESPOND, SHUT THE SYSTEM DOWN AND RESTART. IF THE PROBLEM PERSISTS, CALL SERVICE.

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REVISION HISTORY

REV	DATE	REASON FOR CHANGE
0	April 18, 1996	Production release.
1	Dec. 6, 1996	Revised AEC Software Limit Advatnx-E Console Screen examples in Section 7.
2	May 19, 1997	Added tube warmup note to section 3−5.
3	Mar. 18, 1998	Revised Fluoro Technic Adjust screen to show Fluoro Dose vs Fluoro Detail selections.
4	Sept. 20, 1999	Added Note in Sec. 6 regarding UK regulation disabling console handswitch. Updated Sec. 9, Auto MA/FOV.

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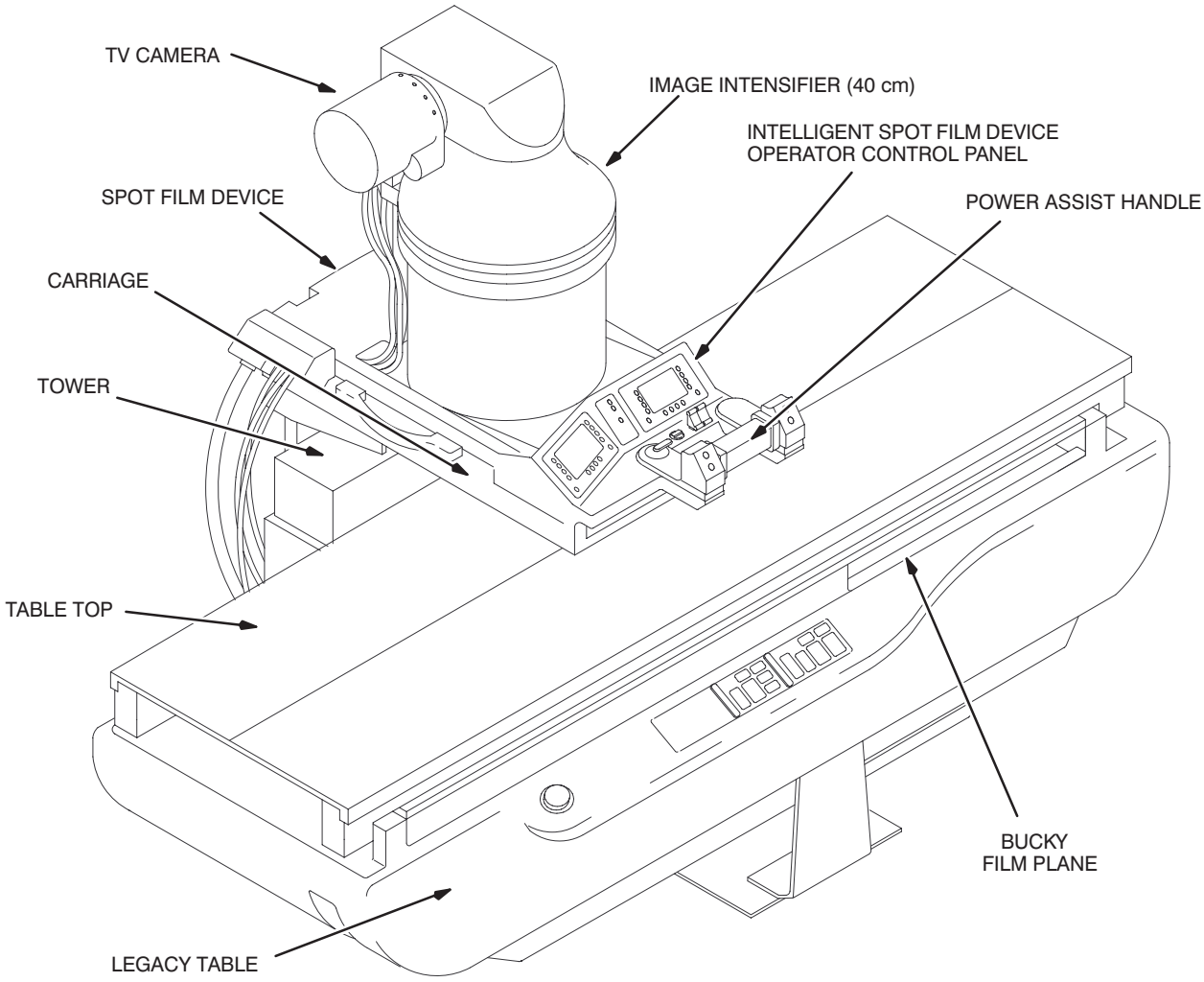
SECTION 1
INTRODUCTION

This manual provides instructions for using the Advantx Console with a Legacy R&F System using an optional DRS Digital Recorder.

Use this manual in conjunction with the *Intelligent Spotfilm Device and Legacy Table* and the *Advantx Before You Start* operating manuals.

Refer to the *Digital Record* operating manual for digital file management and post acquisition image processing.

ILLUSTRATION 1–1
RADIOGRAPHIC AND FLUOROSCOPIC TABLE & SPOT FILM DEVICE



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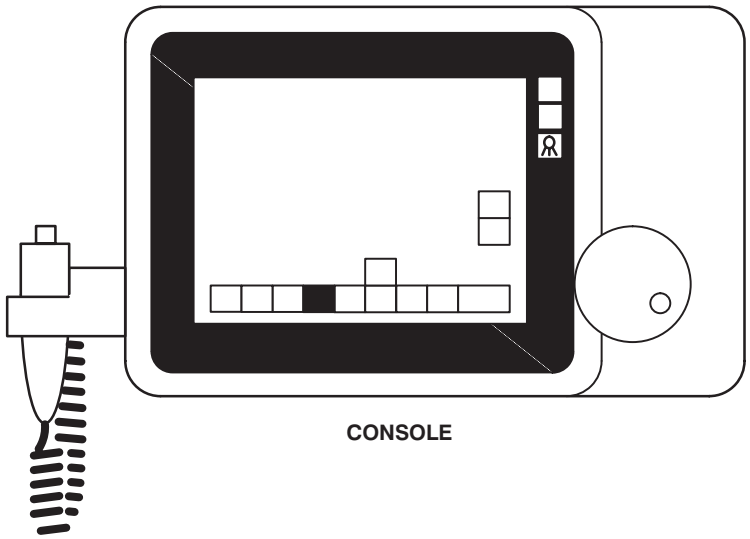
1–1 Section Overview

ILLUSTRATION 1–2
ADVANTX CONSOLE



Section 1: This Introduction.

Section 2: Introduces the Advantx Console and how to turn the console on and off.

Section 3: Using the five basic Advantx Console R&F System screen groups.

Section 4: Overviews of Advantx Console R&F System screen selections.

Section 5: Descriptions of Advantx console screen displays.

Section 6: Acquiring Digital Record images in two Digital Record exposure modes: Record and Fluoro.

Section 7: Describes how to use Advantx Automatic Exposure Control (AEC) function.

Section 8: A brief overview of image process and review for DRS Digital Recorders.

To review and process Digital Record images, refer to the *DRS System Operating Manual* for Digital Record system operating instructions.

Section 9: Descriptions of Advantx console screen selections.

Section 10: Brief overview of Procedure Edit

Section 11: Optional Video Tape Recorder Operation.

Section 12: How to change the time display of the Advantx System clock.

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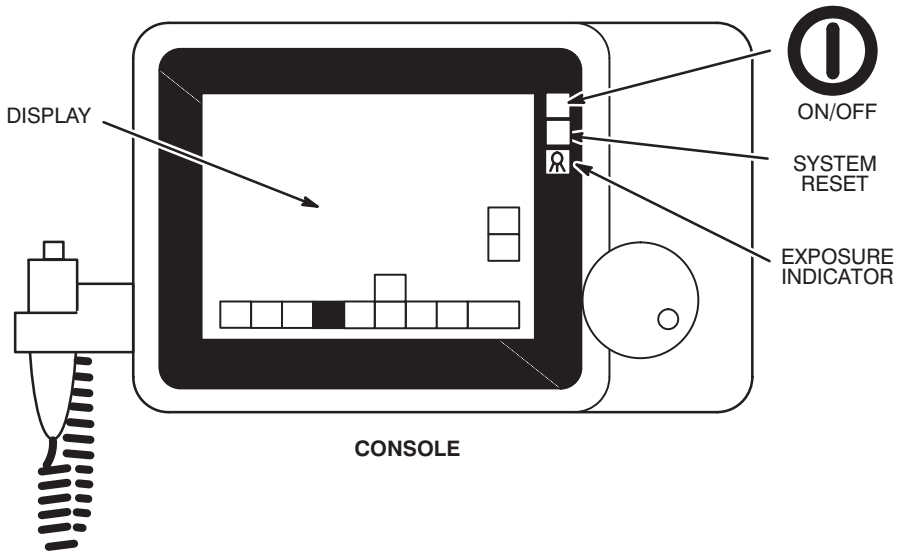
SECTION 2
INTRODUCING THE ADVANTX CONSOLE

The operation of the Advantx X−ray generator centers around using the Advantx Console's control screens, the console's rotary dial and hand control switch.

ILLUSTRATION 2–1
THE ADVANTX CONSOLE



2–1 Turning the Advantx Console On and Off

To access the Advantx Console control screens:

- The Advantx X−ray System must be energized.
- The Applications Program code must be loaded into the Advantx computer memory.

See the *Before You Start* operating manual for details.

- Press the **green** ON/OFF button to turn the console **on**.
- Press the **green** ON/OFF button to turn the console **off**.
- Press the white SYSTEM RESET button to reset the Advantx generator applications program.

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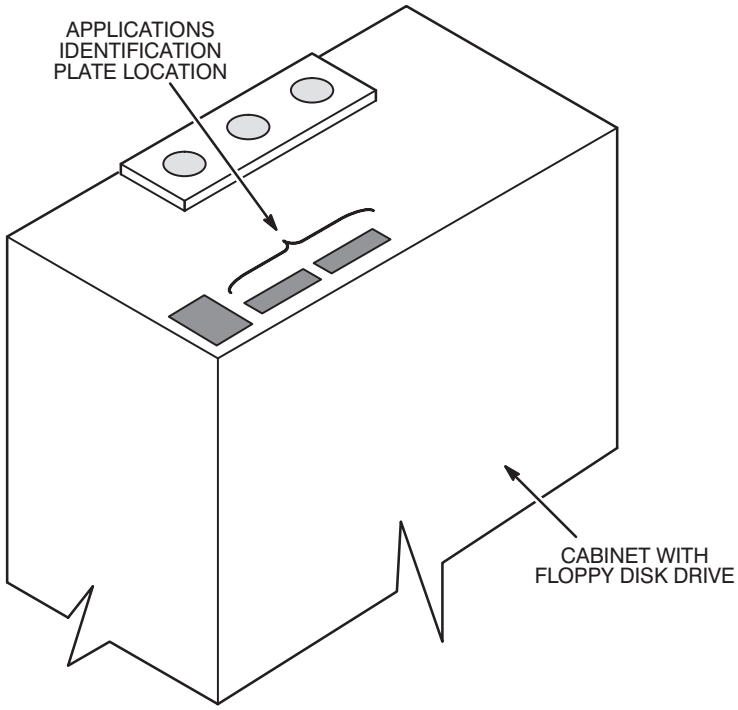
2–2 Equipment Identification

Advantx Applications programs are computer programs used when performing x-ray applications procedures. Portions of the programs are the property of Intel Corporation and are protected by the Copyright Law. This software has been supplied to GE under a license agreement and is furnished subject to the following restrictions: the program shall not be reproduced, copied, or used in whole or in part on equipment other than the designated equipment with which it was furnished without the expressed written consent of Intel Corporation.

Applications is intended for use on a specific Advantx system. Using Applications on a system other than the one for which it is intended is a violation of the Copyright Law. The Applications part number and release information are on an identification plate on the top front edge of the cabinet with the floppy disk drive. Refer to Illustration 2−2 for the location of the identification plate.

ILLUSTRATION 2–2
CABINET IDENTIFICATION



2–3 Console Maintenance

The surface of the Console can be dusted using a soft cloth.

The console display should be cleaned using a damp cloth that has been wetted with ammonia or alcohol based solutions. A mild dish soap solution may also be used instead of ammonia or alcohol solutions.

Note: The cleaning solution must never be poured or sprayed directly onto the Console. The Cloth should always be dampened first and then use it to clean the Console Display surface.

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SECTION 3
ADVANTX CONSOLE SCREEN OVERVIEW

This Section provides an introduction to the five basic Advantx Console R&F System screens groups:

- **Technic Summary screens**
  Provides an overview of current Record and Fluoro parameters.

- **Record Technic Adjust screens**
  Use this screen to control the operation of Record functions.

- **Fluoro Technic Adjust screen**
  Use this screen to control fluoro exposures and the presentation of fluoro images.

- **Record Annotate (New Study)**
  Enter PATIENT NAME, PATIENT ID, and PHYSICIAN data.

- **Tube Warm-Up screen**
  Use this screen to preheat the X−Ray Tube target.

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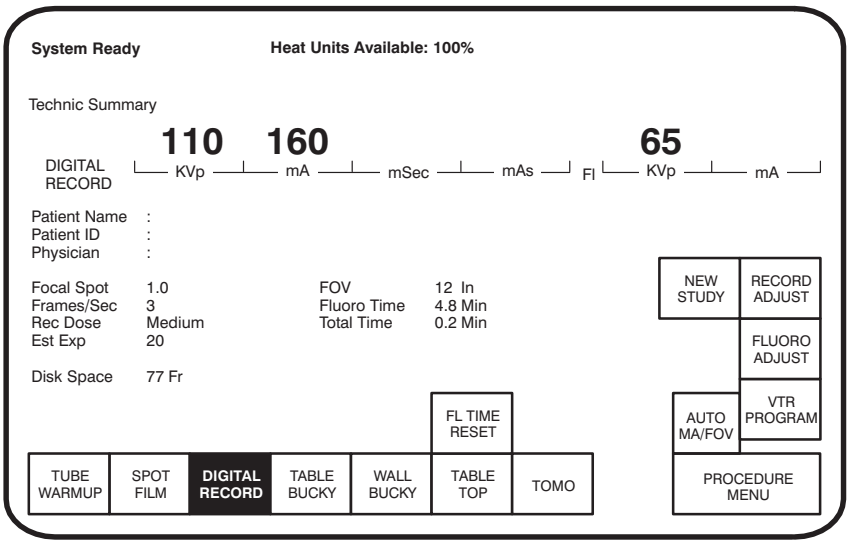
3–1 Technic Summary Screens

The Technic Summary screens provide an overview of both the Record and Fluoro Image Receptor technic parameters for the current image receptor. From this screen select other image receptors for viewing or recording a procedure.

Both Fluoro and Record exposures may be made while Technic Summary Screens are displayed.

3–1–1 Digital Record Technic Summary Screen

ILLUSTRATION 3–1
DIGITAL RECORD TECHNIC SUMMARY SCREEN



- On this screen is displayed:
  - Informational messages
  - mA, kVp, mSec, and mAs for film record exposures
  - Fluoro Exposure kVp and ma
  - Film record exposure frame rate
  - X−ray tube target heat condition
  - Selected focal spot size
  - Fluoro time remaining
  - Total fluoro time of procedure
  - Estimated record exposures
  - Patient's name and Identification
  - Physician's name
  - Selected image intensifier field of View
- On this screen select:
  - System recording receptors
  - Fluoro timer reset
  - Auto mA/FOV feature
  - Other screens

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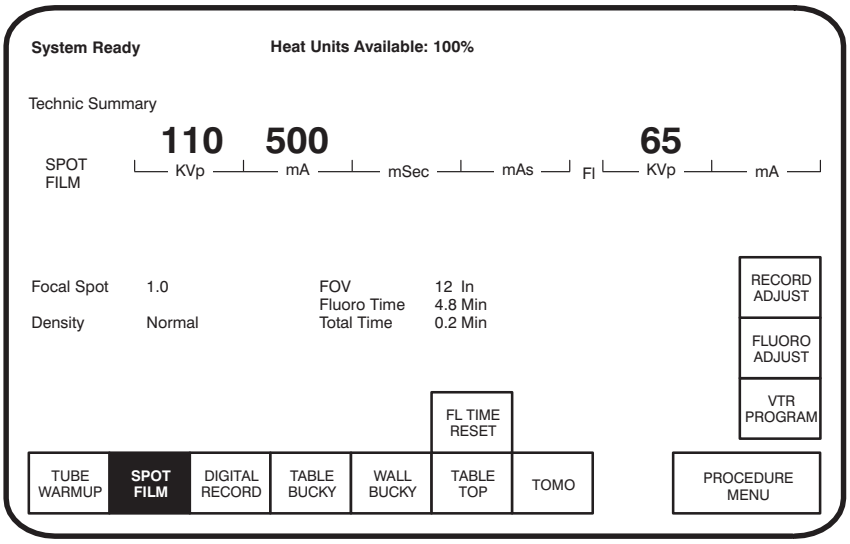
3–1–2 Spot Film Technic Summary Screen

ILLUSTRATION 3–2
SPOT FILM TECHNIC SUMMARY SCREEN



- On this screen is displayed:
  - Informational messages
  - mA, kVp, mSec, and mAs for film record exposures
  - Fluoro Exposure kVp and ma
  - X−ray tube target heat condition
  - Selected focal spot size
  - Fluoro time remaining
  - Total fluoro time of procedure
  - Selected image intensifier field of View
- On this screen select:
  - System recording receptors
  - Fluoro timer reset
  - Other screens

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3–2 Record Technic Adjust Screens

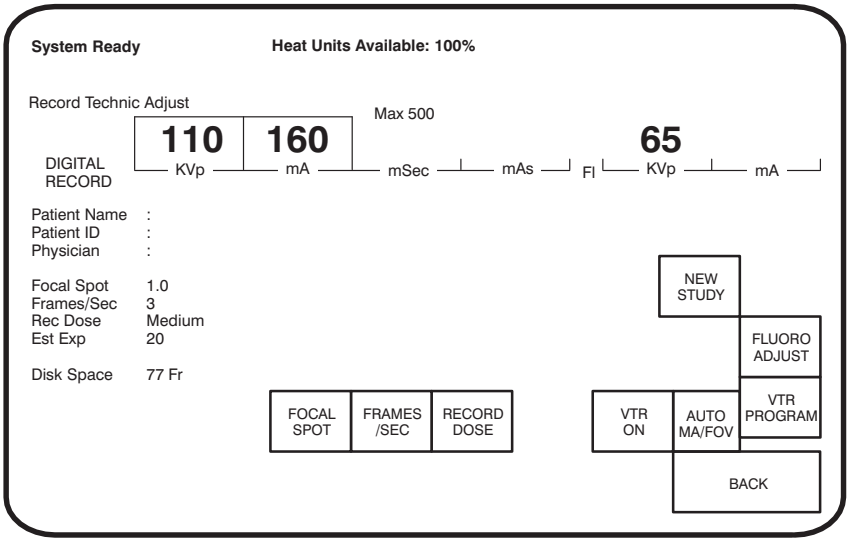
From these screens, select and modify the current X−ray exposure parameter selections for each receptor record image acquisition.

There are up to six different R&F System Record Technic Adjust Screens:

- Digital Record Technic Adjust Screen (Illustration 3−3).
- Spot FIlm Record Technic Adjust Screen (Illustration 3−4).
- Table Bucky Record Technic Adjust Screen (Illustration 3−5).
- Wall Bucky Record Technic Adjust Screen (Illustration 3−6).
- Table Top Record Technic Adjust Screen (Illustration 3−7).
- Tomo Record Technic Adjust Screen (Illustration 3−8).

3–2–1 Digital Record Technic Adjust Screen

ILLUSTRATION 3–3
DIGITAL RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mA
  - Exposure frame rate
  - Focal spot size
  - Optional recording devices
  - Other screens

- Different areas of the screen display:
  - Informational messages
  - mAs and exposure time during record exposures
  - X−ray tube heat condition

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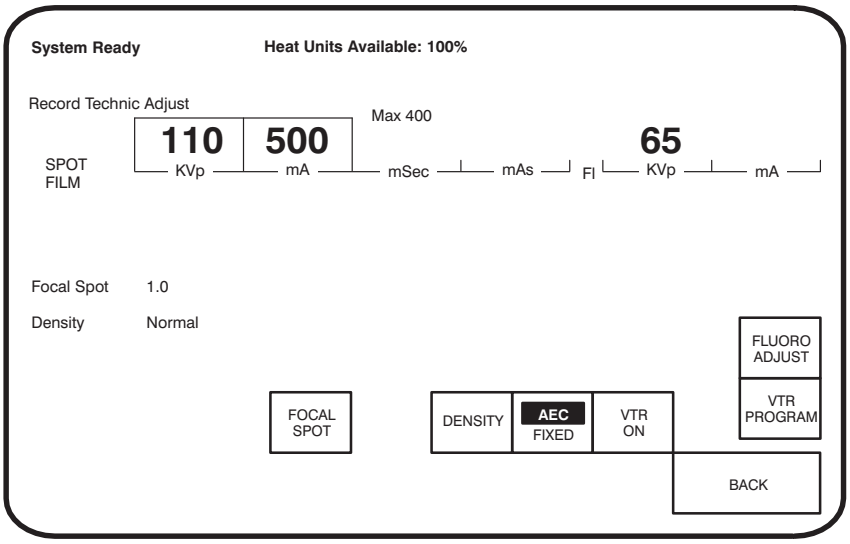
3–2–2 Spot Film Record Technic Adjust Screen

ILLUSTRATION 3–4
SPOT FILM RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mA
  - Focal spot size
  - Film Density adjustments
  - AEC or Fixed Time exposures
  - Optional recording devices
  - Other screens

- Different areas of the screen display:
  - Informational messages
  - mAs and exposure time during record exposures
  - X−ray tube heat condition

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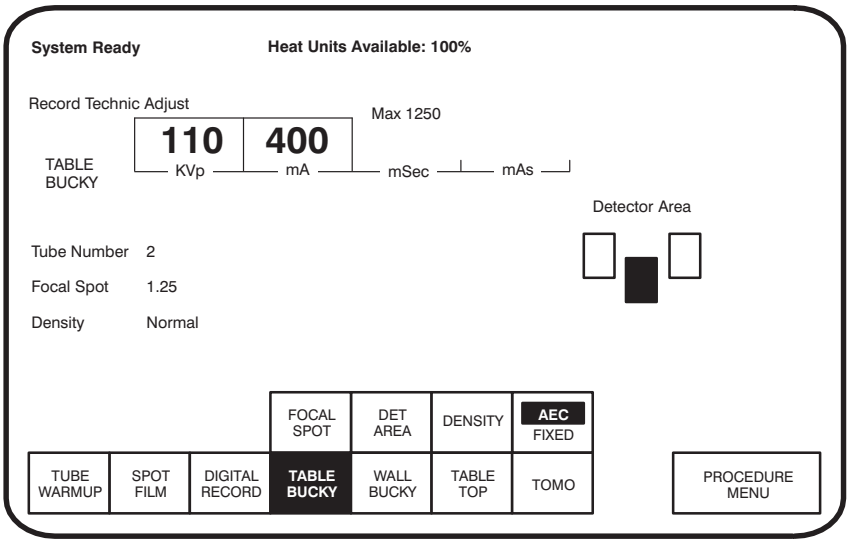
3–2–3 Table Bucky Record Technic Adjust Screen

ILLUSTRATION 3–5
TABLE BUCKY RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mA
  - Focal spot size
  - Film Density adjustments
  - AEC or Fixed Time exposures
  - Ion Chamber Detector Areas
  - Optional recording devices
  - Other screens

- Different areas of the screen display:
  - Informational messages
  - X−Ray Tube number
  - mAs and exposure time during record exposures
  - X−ray tube heat condition

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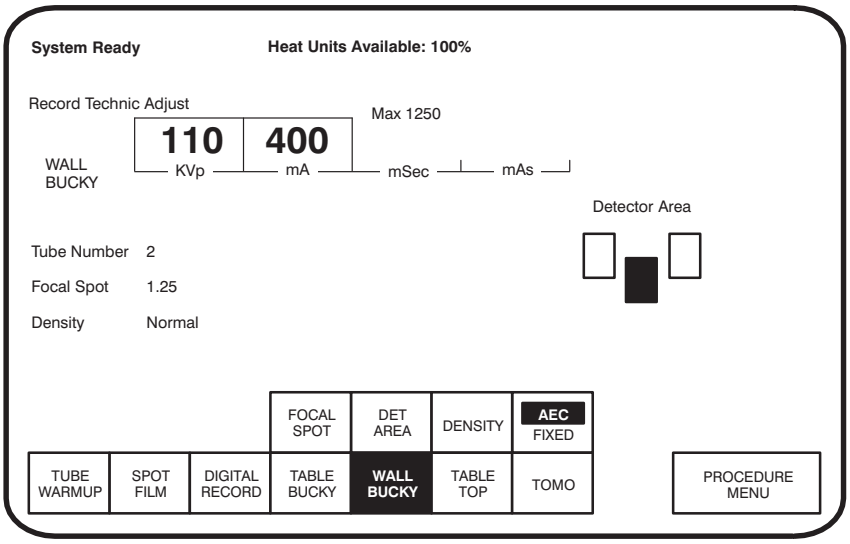
3–2–4 Wall Bucky Record Technic Adjust Screen

ILLUSTRATION 3–6
WALL BUCKY RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mA
  - Focal spot size
  - Film Density adjustments
  - AEC or Fixed Time exposures
  - Ion Chamber Detector Areas
  - Optional recording devices
  - Other screens

- Different areas of the screen display:
  - Informational messages
  - X−Ray Tube number
  - mAs and exposure time during record exposures
  - X−ray tube heat condition

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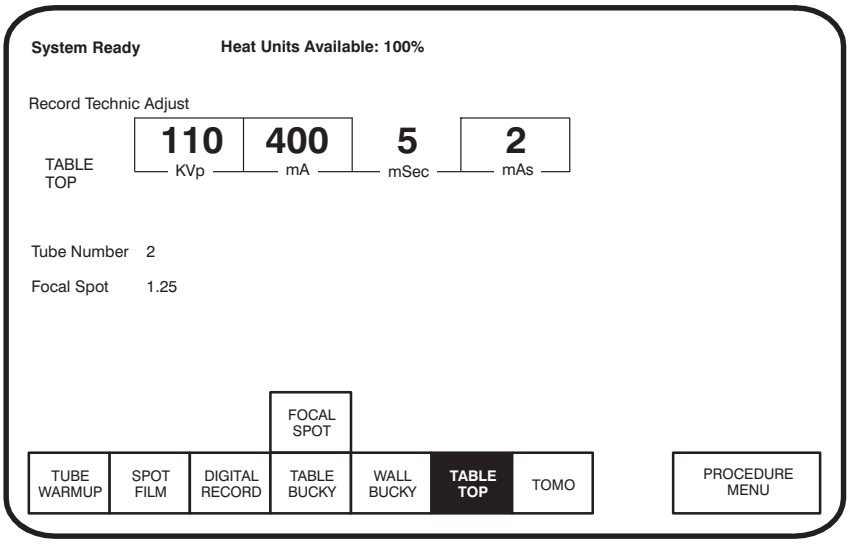
3–2–5 Table Top Record Technic Adjust Screen

ILLUSTRATION 3–7
TABLE TOP RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mA
  - Exposure mAs
  - Focal spot size

- Different areas of the screen display:
  - Informational messages
  - X–Ray Tube number
  - X–ray tube heat condition

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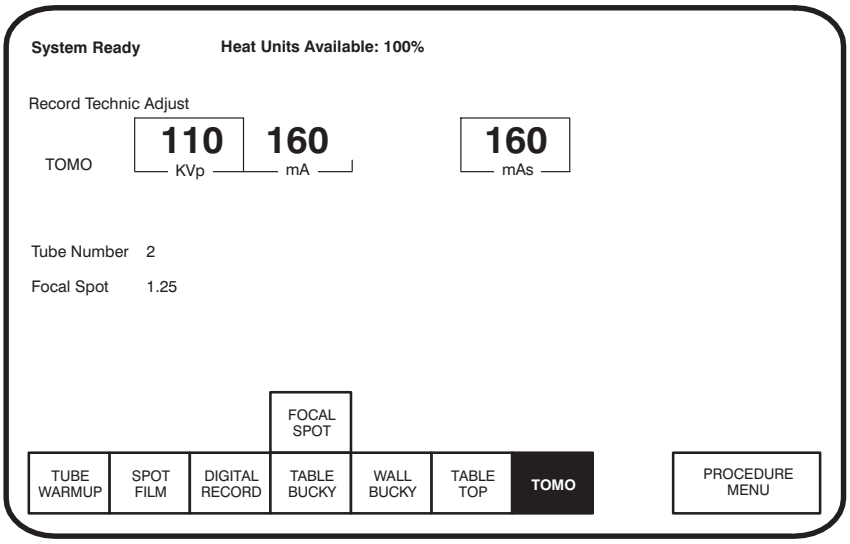
3–2–6 Tomo Record Technic Adjust Screen

ILLUSTRATION 3–8
TOMO RECORD TECHNIC ADJUST



- From this screen select:
  - Exposure kVp
  - Exposure mAs
  - Focal spot size

- Different areas of the screen display:
  - Informational messages
  - X–Ray Tube number
  - X–ray tube heat condition

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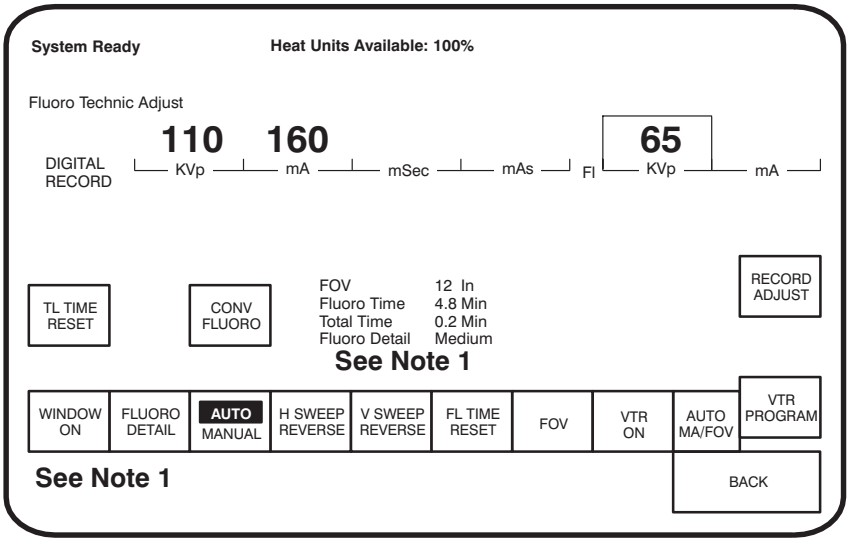
3–3 Fluoro Technic Adjust Screen

From this screen select and modify the X−ray exposure parameter selections for for fluoro imaging.

ILLUSTRATION 3–9
FLUORO TECHNIC ADJUST



Note 1: Depending on local regulations, the system may be configured such that the Fluoro Detail button also controls the fluoro dose. In that case, the button will be relabeled as Fluoro Dose. Please consult your local GE representative if you have any questions about how your system has been configured. The FLUORO DOSE selections will be as follows:

Low = 5 R/min, Low Detail
Medium = 5 R/min, Medium Detail
High = 10 R/min Medium Detail

The Fluoro Technic Adjust screen has two fluoro modes: Auto Fluoro Adjust and Manual Fluoro Adjust.

In Auto mode, constant image brightness is maintained through Automatic Brightness Control (ABC).

In Manual mode, manual adjustments to kVp and mA are required for image brightness control.

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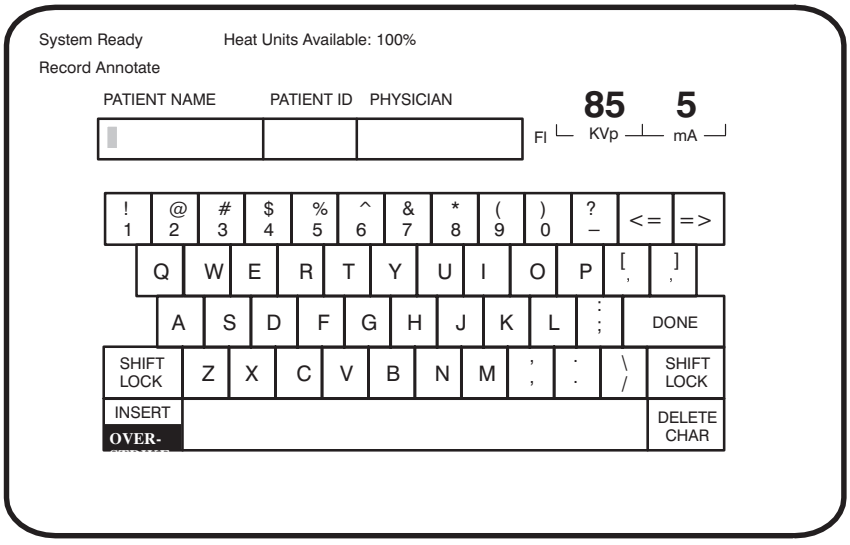
- From this screen select:
  - Fluoro exposure kVp
  - Fluoro operating mode
  - Image intensifier field of View
  - Auto or manual fluoro exposure
  - Change TV monitor presentation
  - Auto mA/FOV feature (Digital Record Fluoro Technic Adjust screen only)
  - Display ABC window
  - Optional recording devices
  - Other screens
- Different areas of the screen display:
  - Informational messages
  - mA, kVp, during Fluoro exposures
  - X−ray tube heat condition
  - Amount fluoro exposure time in 5 minute segments
  - Total elapse fluoro exposure time

3–4 Record Annotate (New Study) Screen

From this screen enter patient and physician data for the diagnostic procedure. This data then appears on console screens and on the recorded images.

ILLUSTRATION 3–10
RECORD ANNOTATE



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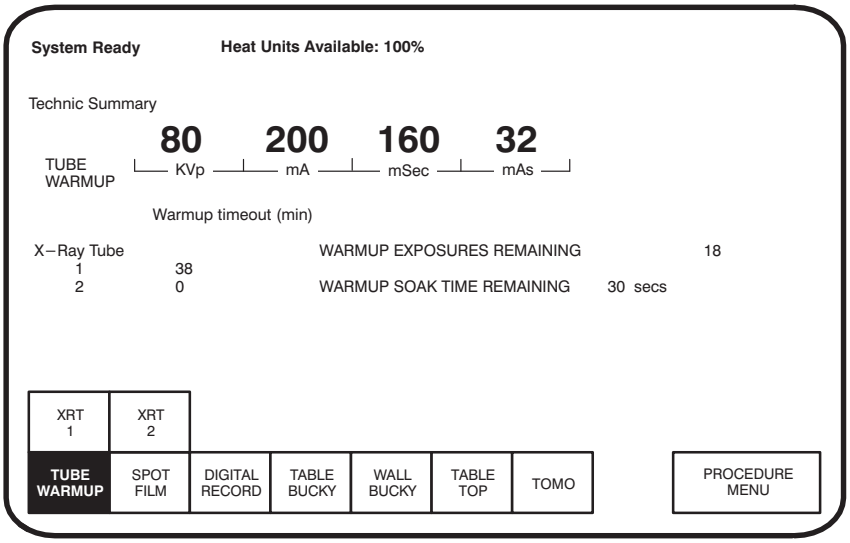
3–5 The Tube Warm–Up Screen

Use this screen to preheat the X–Ray tube target prior to diagnostic use. Preheating the target can extend the life of the X–Ray tube and prevents damage to the X–Ray tube assembly. X–Ray Tube 1 is the Fluoro tube.

ILLUSTRATION 3–11
FLUORO TECHNIC ADJUST



Note: When performing a tube warm–up procedure for the under table or over table x–ray tube, the operator must remember that a tube warm up procedure produces a series of exposures and therefore produces a small amount of scatter radiation even though the collimator blades are at their minimum open position. Therefore, the following steps are recommended to be taken to minimize the effect of this small amount of non–diagnostic radiation in addition to the normal precautionary steps taken when producing diagnostic radiation. Secondarily, these steps will also help protect the Image Intensifier input phosphor from being irradiated when power is not being applied to it when performing an under table tube warm up.

1. It is not recommended to have a patient on the table or people in the room while performing under and over table tube warm–ups. Perform under and over table tube warm–ups before people enter the room or while the patient is being prepared for the procedure. If this is not possible or feasible, move the table top to one travel extreme and move the fluoro carriage to the opposite end and perform the following steps below. For over table tube warm–ups, move the XT to a remote corner of the room.

2. Move the table bucky to a position so that it is over the table tube. This position on the table top is directly below the Image Intensifier and Intelligent Spot Film Device.

3. Lay a lead apron on the table top in a position so that it is over the table tube and collimator.

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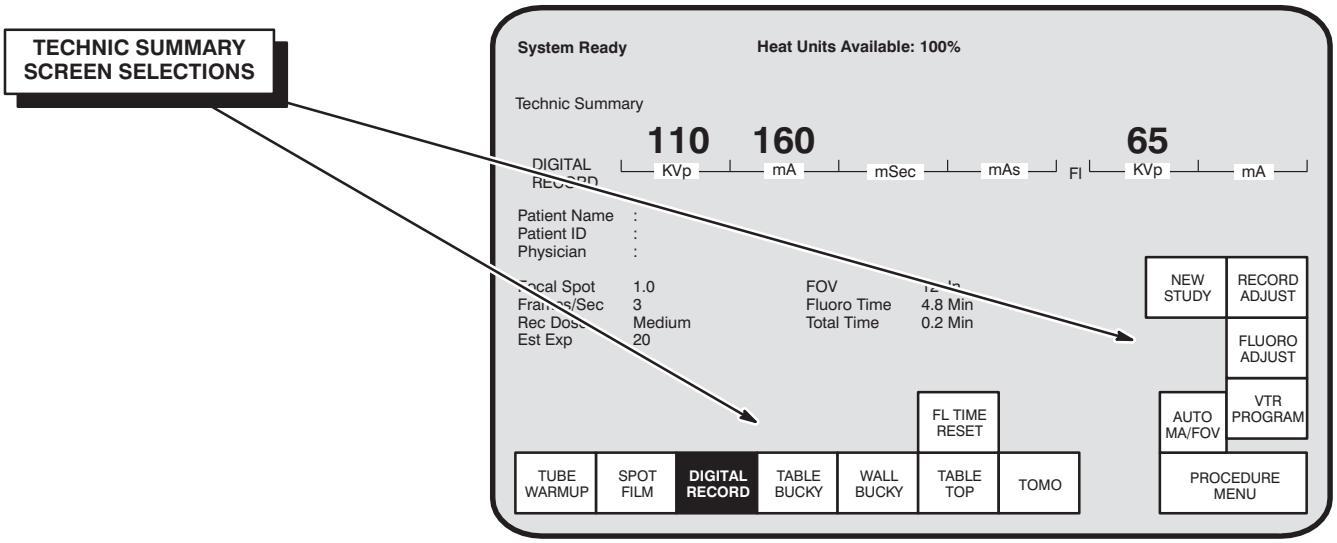
SECTION 4
CONSOLE SCREEN SELECTIONS

Refer to Section NO TAG for alphabetical listing of all console screen selections and descriptions.

4–1 Technic Summary Screen Selections

4–1–1 Digital Record Technic Summary Screen Selections

ILLUSTRATION 4–1
TECHNIC SUMMARY SCREEN SELECTIONS (DIGITAL RECORD)



Touch the selections on this screen to:

- Move to the Record Technic Adjust screen.
- Move to the Fluoro Technic Adjust screen.
- Move to the Record Annotate (New Study) screen.
- Move to Tube Warm−up screen.
- Reset Fluoro timer.
- Select Digital Record or other image receptors.
- Select the Auto mA/FOV feature (Digital Record Technic Summary screen only).
- Select Procedure Select menu.

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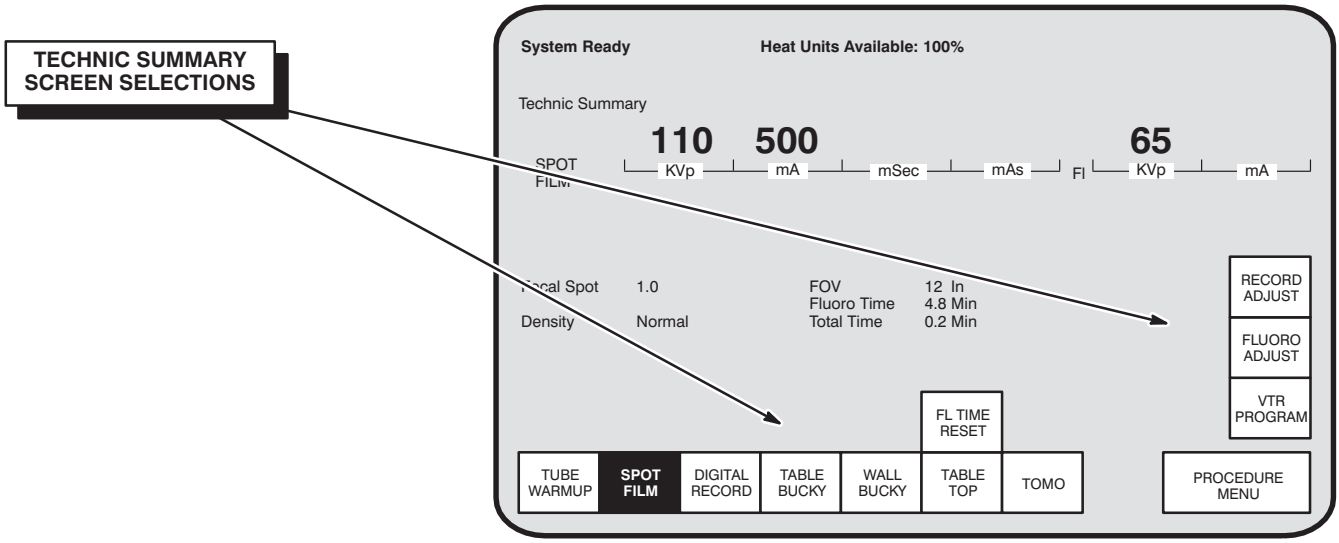
4–1–2 Spot Film Technic Summary Screen Selections

ILLUSTRATION 4–2
TECHNIC SUMMARY SCREEN SELECTIONS (SPOT FILM)



Touch the selections on this screen to:

- Move to the Record Technic Adjust screen.
- Move to the Fluoro Technic Adjust screen.
- Move to Tube Warm−up screen.
- Reset Fluoro timer.
- Select Digital Record or other image receptors.
- Select Procedure Select menu.

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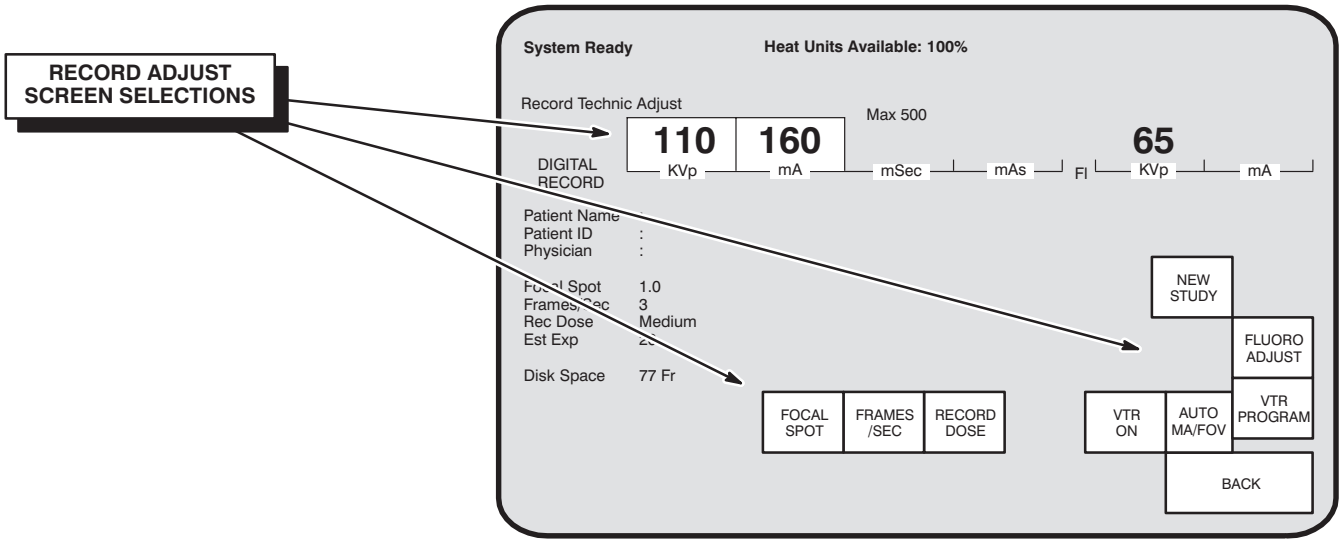
4–2 Record Technic Adjust Screen Selections

4–2–1 Digital Record Technic Adjust Screen Selections

ILLUSTRATION 4–3
DIGITAL RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Move to the Fluoro Technic Adjust screen.
- Move to the VTR Program screen.
- Go back to the Technic Summary screen.
- Change focal spot size.
- Select exposure frame rate.
- Select dose rate.
- Select Record kVp and mA.
- Enter Record annotation information.
- Select video tape recorder.
- Select the Auto mA/FOV feature (Digital Record Technic Summary screen only).

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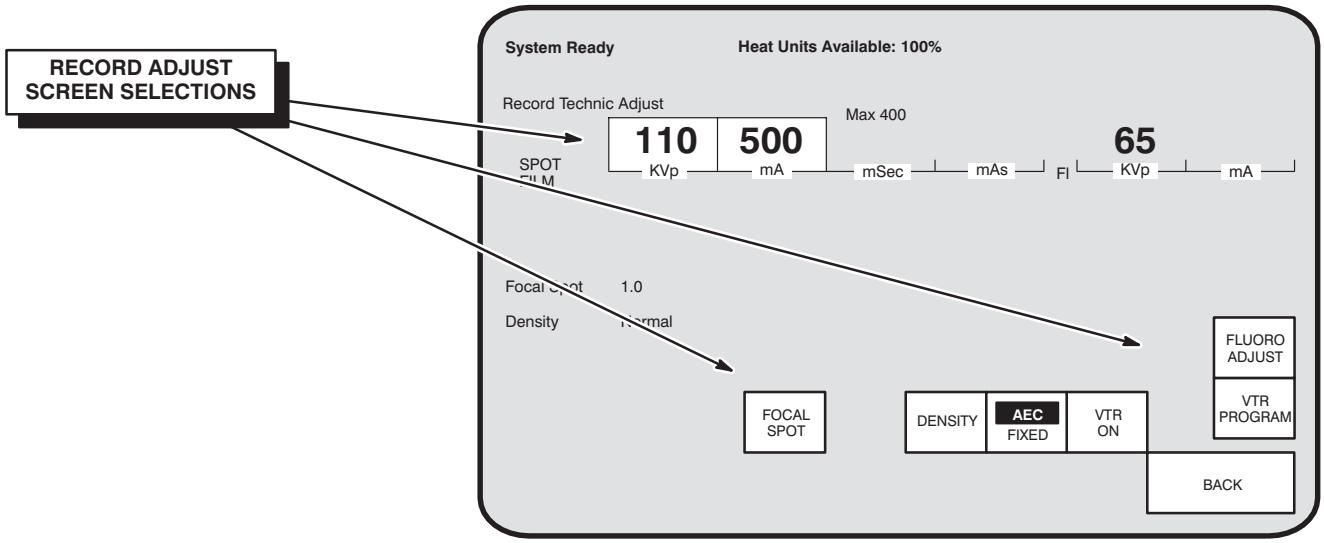
4–2–2 Spot Film Record Technic Adjust Screen Selections

ILLUSTRATION 4–4
SPOT FILM RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Move to the Fluoro Technic Adjust screen.
- Move to the VTR Program screen.
- Go back to the Technic Summary screen.
- Change focal spot size.
- Select film density.
- Select AEC exposure mode.
- Select Record kVp and mA.
- Select video tape recorder.

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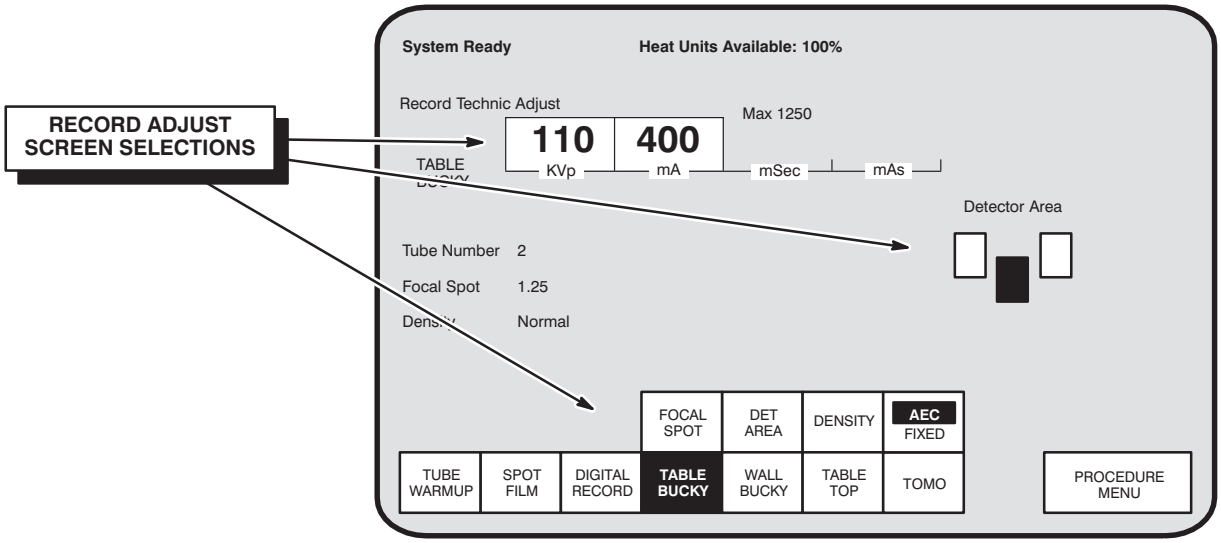
4–2–3 Table Bucky Record Technic Adjust Screen Selections

ILLUSTRATION 4–5
TABLE BUCKY RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Change focal spot size.
- Select Ion Chamber detection areas.
- Select film density.
- Select AEC exposure mode.
- Select Record kVp and mA.
- Select Procedure Select menu.
- Select Digital Record or other image receptors.

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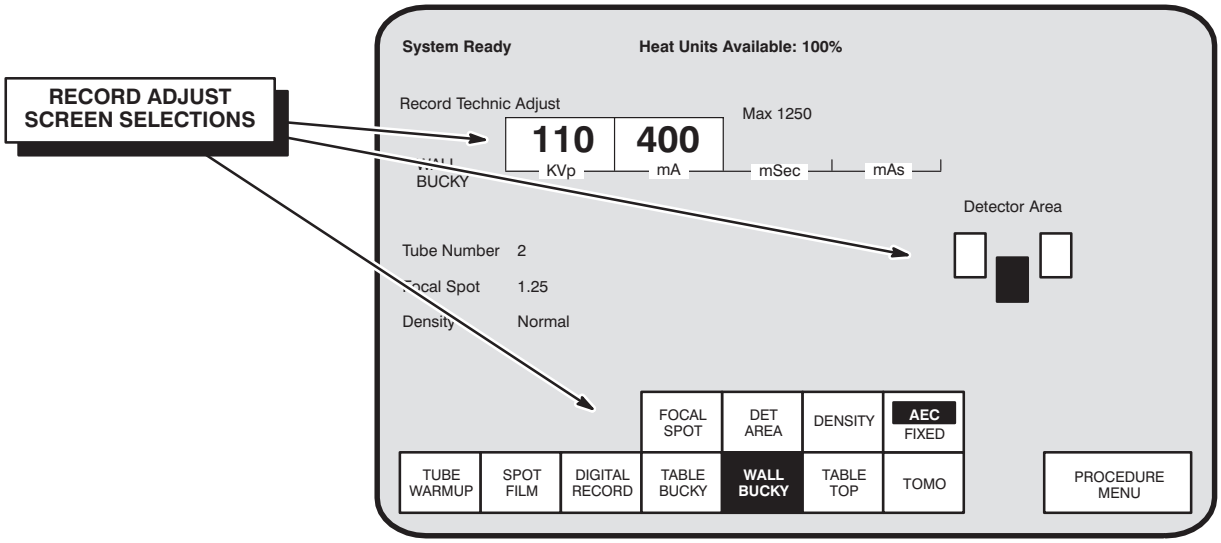
4–2–4 Wall Bucky Record Technic Adjust Screen Selections

ILLUSTRATION 4–6
WALL BUCKY RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Change focal spot size.
- Select Ion Chamber detection areas.
- Select film density.
- Select AEC exposure mode.
- Select Record kVp and mA.
- Select Procedure Select menu.
- Select Digital Record or other image receptors.

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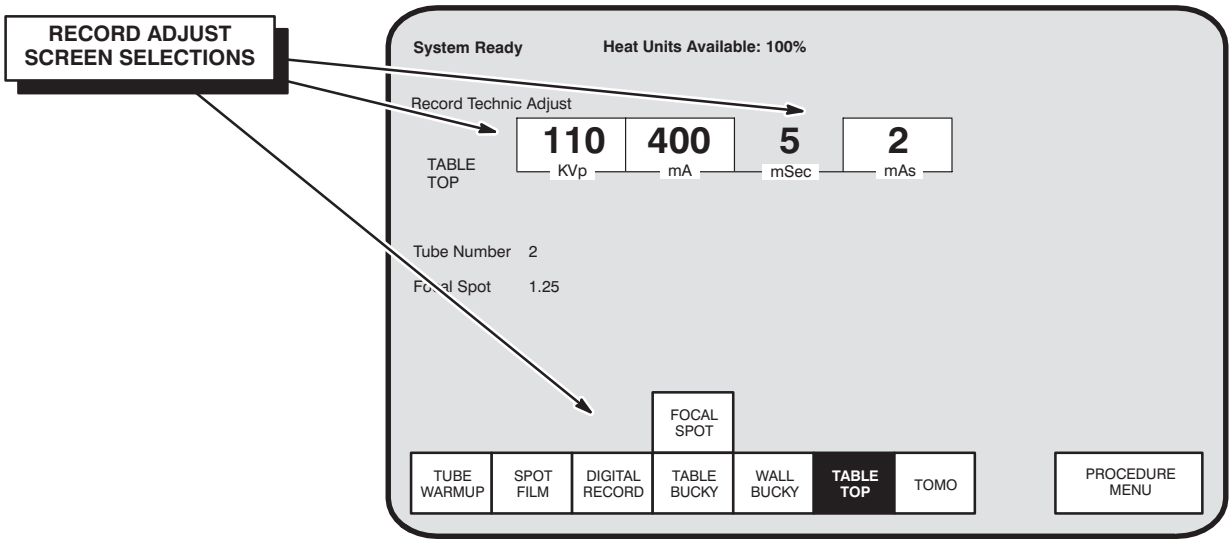
4–2–5 Table Top Record Technic Adjust Screen Selections

ILLUSTRATION 4–7
TABLE TOP RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Change focal spot size.
- Select Record kVp, mA, and mAs.
- Select Procedure Select menu.
- Select Digital Record or other image receptors.

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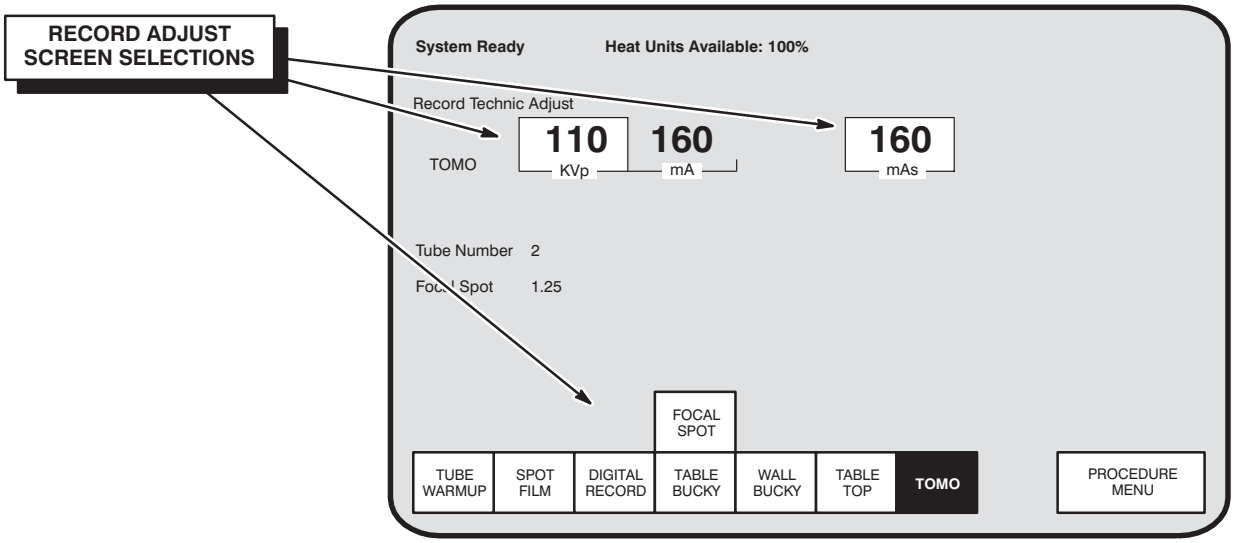
4–2–6 Tomo Record Technic Adjust Screen Selections

ILLUSTRATION 4–8
TOMO RECORD TECHNIC ADJUST SCREEN SELECTIONS



Touch the selections on this screen to:

- Change focal spot size.
- Select Record kVp, and mAs.
- Select Procedure Select menu.
- Select Digital Record or other image receptors.

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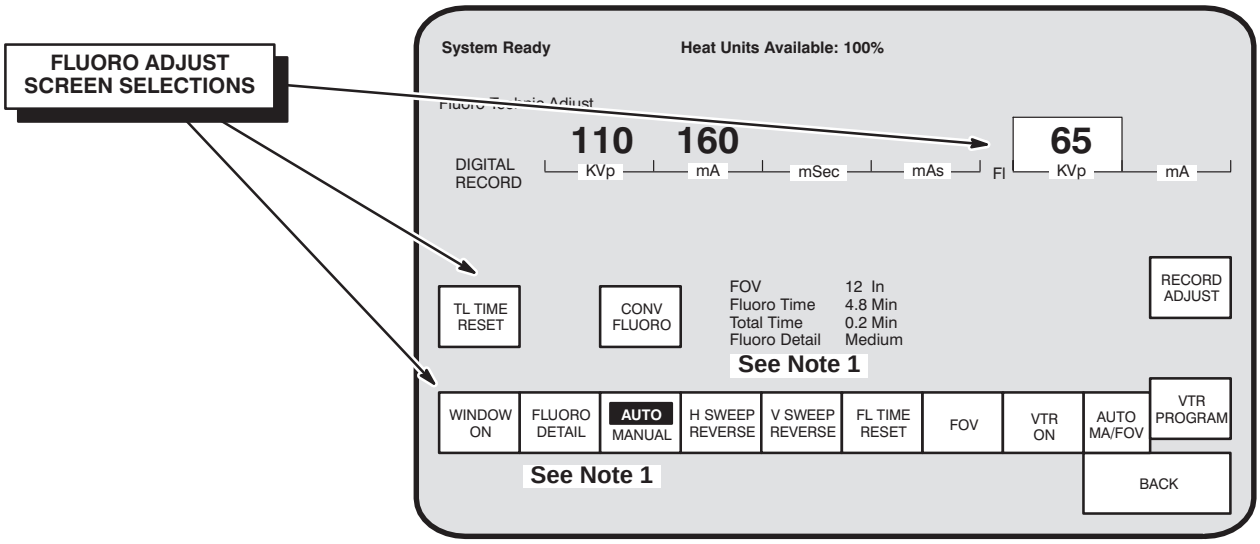
4–3 Fluoro Technic Adjust Screen Selections

ILLUSTRATION 4–9
FLUORO TECHNIC ADJUST SCREEN



Note 1: Depending on local regulations, the system may be configured such that the Fluoro Detail button also controls the fluoro dose. In that case, the button will be relabeled as Fluoro Dose. Please consult your local GE representative if you have any questions about how your system has been configured. The FLUORO DOSE selections will be as follows:

Low = 5 R/min, Low Detail
Medium = 5 R/min, Medium Detail
High = 10 R/min Medium Detail

Touch the selections on this screen to:

- Move to the Record Technic Adjust screen.
- Move to the VTR Program screen.
- Go back to the Technic Summary screen.
- Reset the Fluoro timer.
- Reset procedure total timer.
- Select Fluoro detail.
- Select auto or manual mA control.
- Adjust video presentation.
- Adjust fluoro kVp.
- Select field of view.
- Display ABC exposure window.
- Select the Auto mA/FOV feature (Digital Record Fluoro Technic Adjust screen only).
- To record fluoro exposures on video tape.

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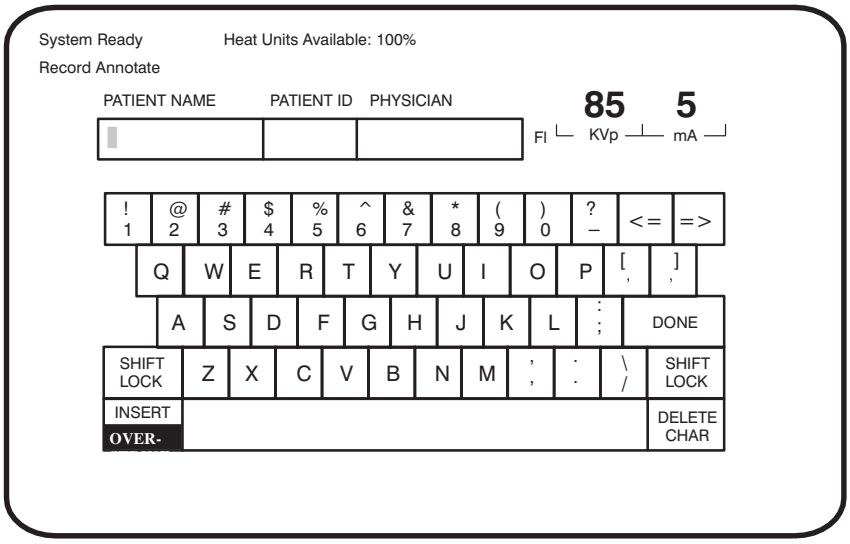
4–4 Record Annotate (New Study) Screen

PATIENT NAME, PATIENT ID, and PHYSICIAN data are entered from the Record Annotate screen. This data then appears on the Technic Summary screen, the Record Technic Adjust screens, and on the recorded images.

- To access the Record Annotate screen, touch the **NEW STUDY** selection on the Technic Summary or Record Technic Adjust screen.
- To enter data, touch the characters on the "typewriter" keyboard (see Illustration 4–10).

ILLUSTRATION 4–10
RECORD ANNOTATE



The following is a listing of selected Record Annotate selections:

PATIENT NAME

Position the cursor at the left side of this box and use the "typewriter" screen keyboard to enter this study's **PATIENT NAME**. Position the cursor by using the "arrow" keys (⇐, ⇒), or touch this box.

PATIENT ID

Position the cursor at the left side of this box and use the "typewriter" screen keyboard to enter the **PATIENT ID**. Position the cursor by using the "arrow" keys (⇐, ⇒), or touch this box.

PHYSICIAN

Position the cursor at the left side of this box and use the "typewriter" screen keyboard to enter this study's **PHYSICIAN**. Position the cursor by using the "arrow" keys (⇐, ⇒), or touch this box.

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Touch the **SHIFT LOCK** key to toggle between lower case and UPPER CASE characters.

When UPPER CASE characters are selected, **SHIFT LOCK** is highlighted.

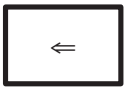
Use the **SHIFT LOCK** key to enter the symbolic characters that appear at the tops of the numeric keys. The default selection is lower case.

Touch the **Insert Ovrstrke** key to toggle between these cursor properties.

When **Ovrstrke** is selected, typing a new character with the cursor positioned over an old character replaces (overstrikes) the old character with the new.

When **Insert** is selected, typing a new character with the cursor positioned over an old character inserts the new character to the left of the old. The selected cursor property is highlighted.

Ovrstrke is the default selection.



Touch the “left arrow” key to move the cursor to the left (within the **PATIENT NAME, PATIENT ID,** and **PHYSICIAN** boxes).

Touch the “right arrow” key to move the cursor to the right (within the **PATIENT NAME, PATIENT ID,** and **PHYSICIAN** boxes).

Touch the **DELETE CHAR** key to remove the character to the left of the cursor.

Touch the **DONE** key to save the **PATIENT NAME, PATIENT ID,** and **PHYSICIAN** entries, exit from the Record Annotate screen, and return to the previously displayed screen.

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SECTION 5
CONSOLE SCREEN DISPLAYS

5–1 Digital Record Screen Record Mode Displays (Technic Summary and Record Technic Adjust)

ILLUSTRATION 5–1
DIGITAL RECORD TECHNIC SUMMARY RECORD MODE SCREEN DISPLAYS

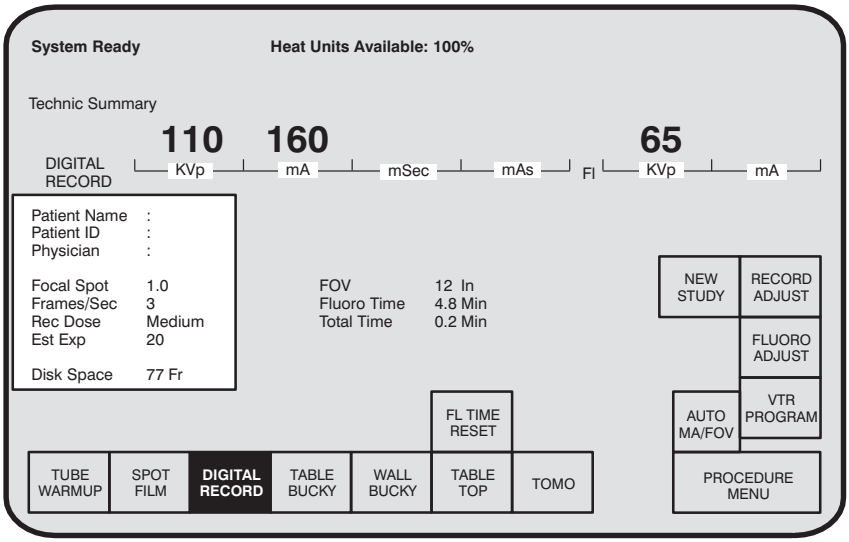
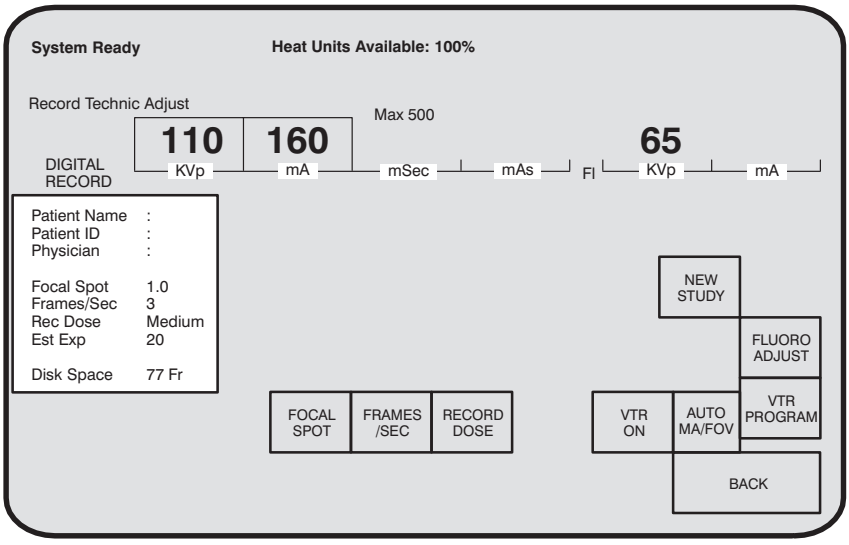


ILLUSTRATION 5–2
DIGITAL RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS



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Patient Name	The current study's patient name, as entered on the Record Annotate screen.
Patient ID	The current study's patient ID number, as entered on the Record Annotate screen.
Physician	Physician for the current study, as entered on the Record Annotate screen.
Focal Spot	The Focal spot size selection displayed in millimeters. The focal spot sizes are RETNA Standard measurements.
Frames/Sec	The Digital Record exposure rate per second.
Rec Dose	For Record Dose, select High, Medium or Low.
Est Exp	The estimated number of exposures possible based for the selected technique and the amount of heat units remaining.
Disk Space	The amount of space remaining in Digital Recorder memory for storage of record image frames.

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5–2 Spot Film Record Screen Record Mode Displays (Technic Summary and Record Technic Adjust)

ILLUSTRATION 5–3
SPOT FILM TECHNIC SUMMARY RECORD MODE SCREEN DISPLAYS

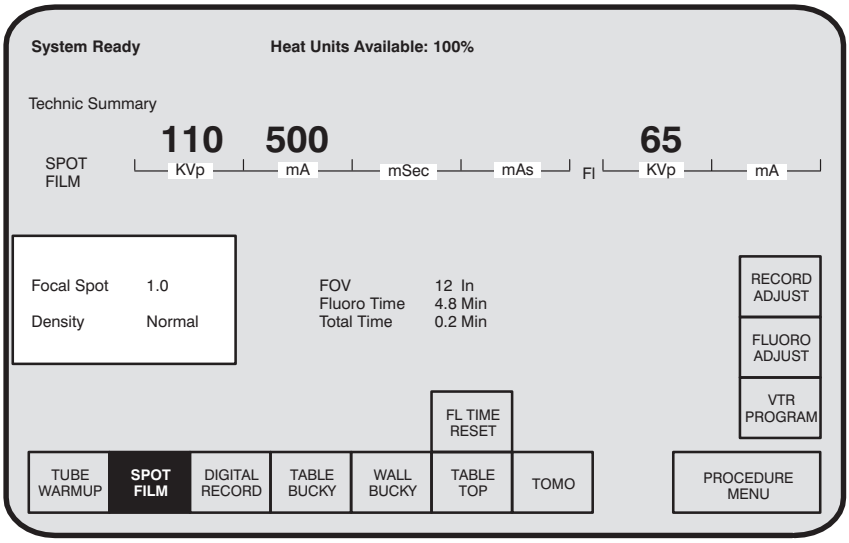
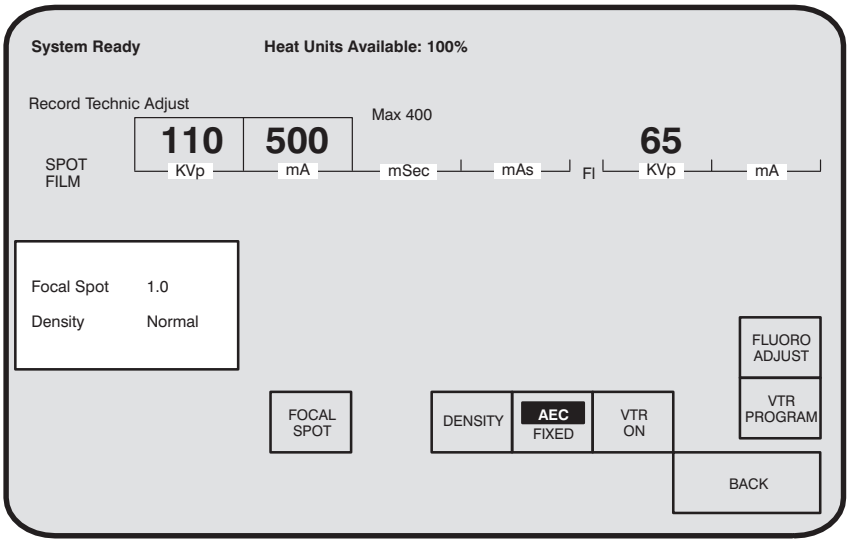


ILLUSTRATION 5–4
SPOT FILM RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS



Focal Spot The Focal spot size selection displayed in millimeters. The focal spot sizes are RETNA Standard measurements.

Density The additional modifications to film density for technic selections using automatic exposure control.

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5–3 Table and Wall Bucky Record Mode Screen Displays (Record Technic Adjust)

ILLUSTRATION 5–5
TABLE BUCKY RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS

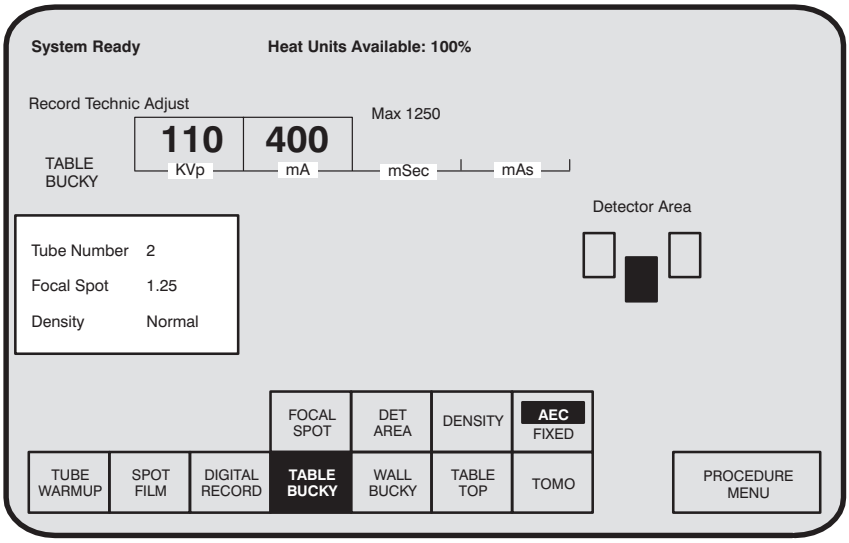
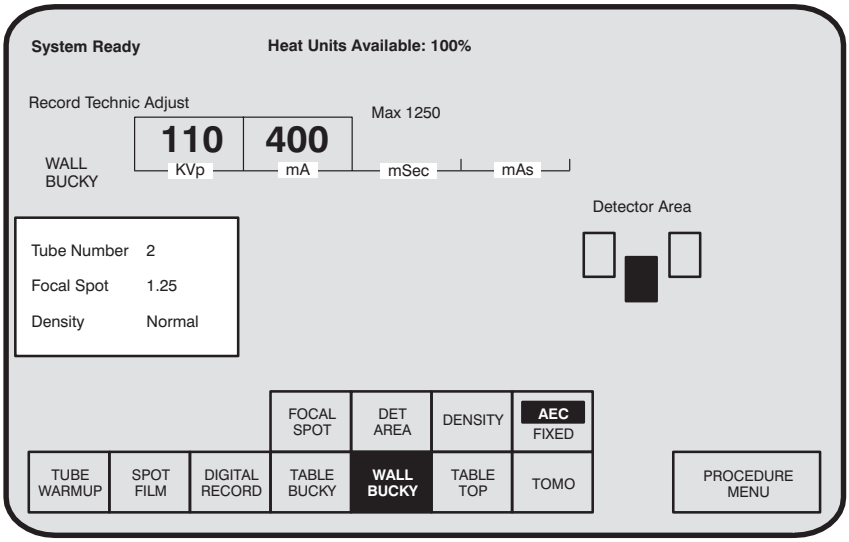


ILLUSTRATION 5–6
WALL BUCKY RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS



Tube Number The number of the currently selected X−Ray tube.

Focal Spot The Focal spot size selection displayed in millimeters. The focal spot sizes are RETNA Standard measurements.

Density The additional modifications to film density for technic selections using automatic exposure control.

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5–4 Table Top and Tomo Record Mode Screen Displays (Record Technic Adjust)

ILLUSTRATION 5–7
TABLE TOP RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS

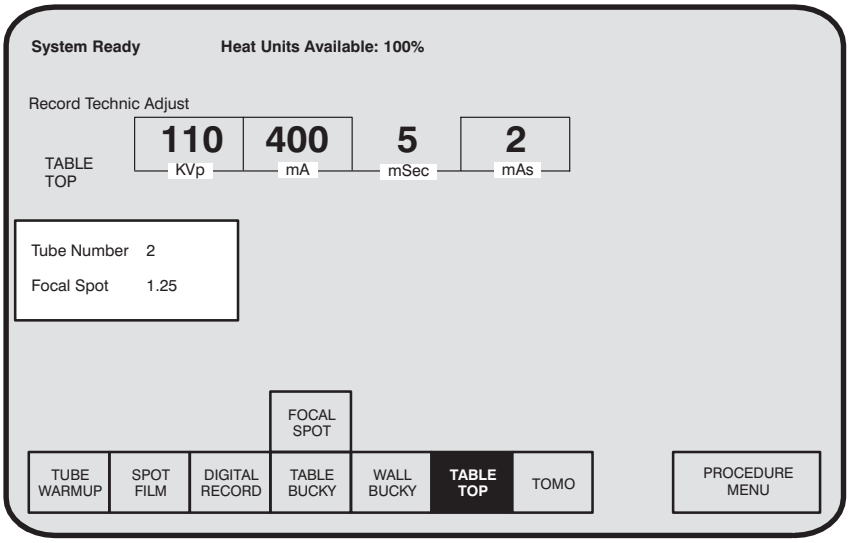
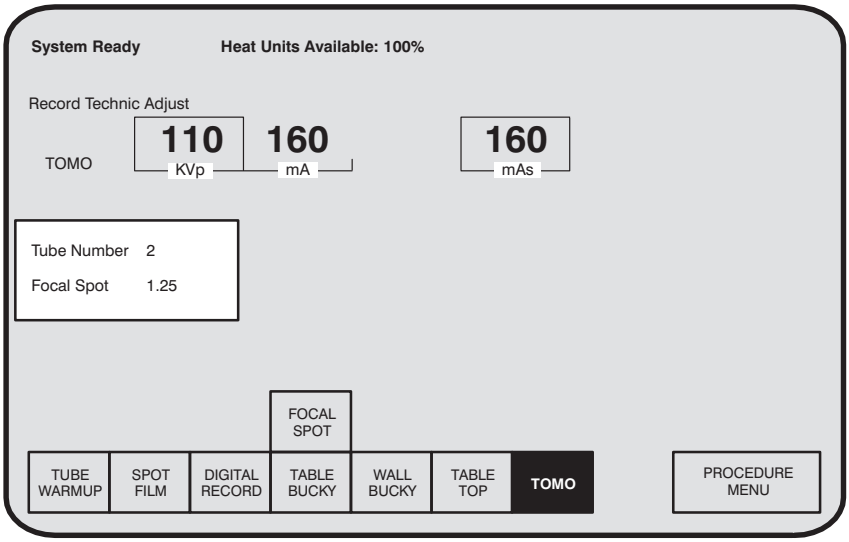


ILLUSTRATION 5–8
TOMO RECORD TECHNIC ADJUST RECORD MODE SCREEN DISPLAYS



Tube Number The number of the currently selected X−Ray tube.

Focal Spot The Focal spot size selection displayed in millimeters. The focal spot sizes are RETNA Standard measurements.

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5–5 Fluoro Mode Screen Displays (Technic Summary and Fluoro Technic Adjust Screens)

ILLUSTRATION 5–9
DIGITAL RECORD TECHNIC SUMMARY FLUORO MODE DISPLAYS

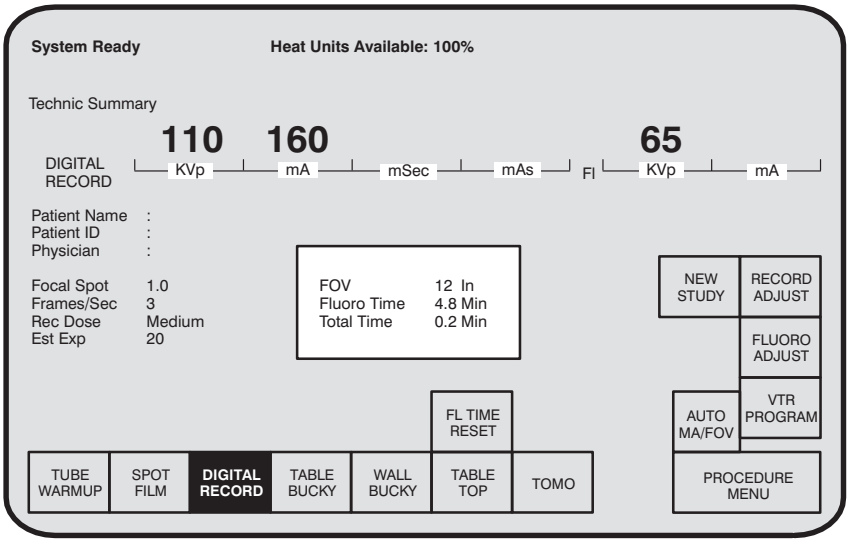

ILLUSTRATION 5–10
SPOT FILM TECHNIC SUMMARY FLUORO MODE SCREEN DISPLAYS

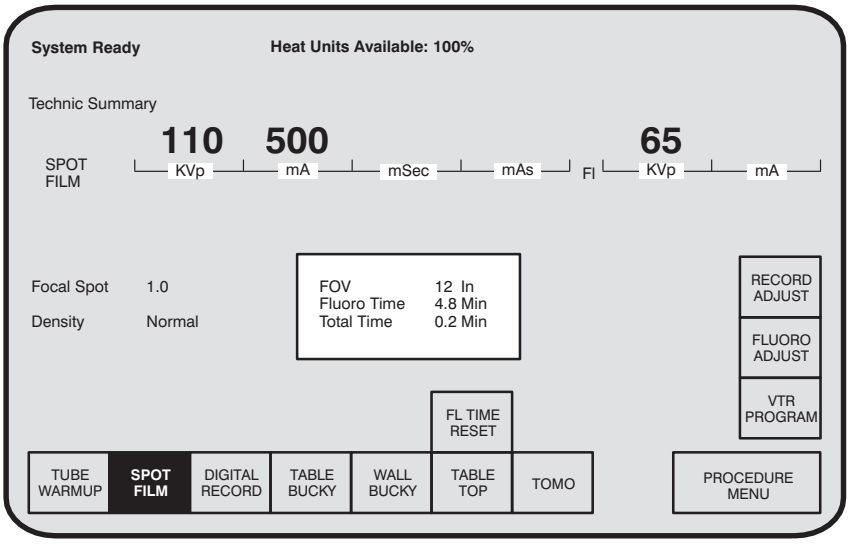

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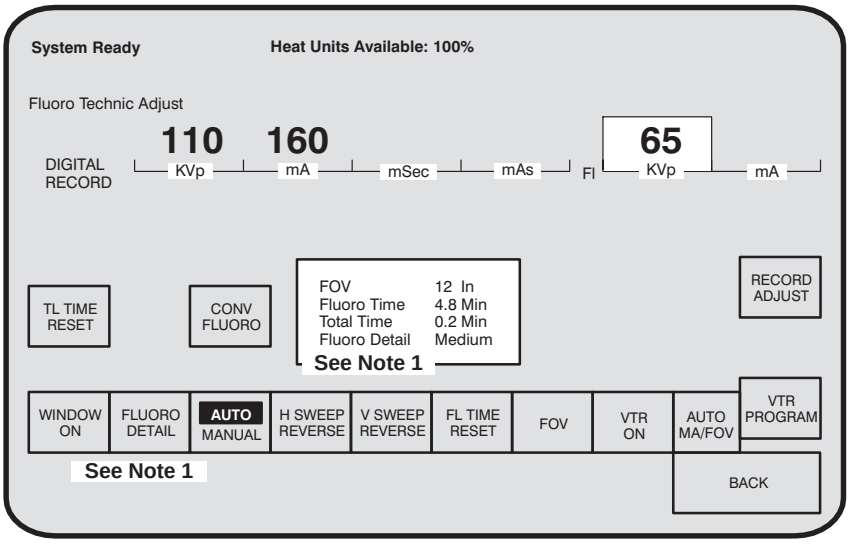
ILLUSTRATION 5–11
FLUORO TECHNIC ADJUST FLUORO MODE SCREEN DISPLAYS



FOV — The image intensifier field of view size.
16, 12, 9, 6, or 4.5 inch multiple field of view selections may be available.

Fluoro Time — The remaining fluoro time.

Total Time — The total accumulated Fluoro time.

Fluoro Detail — For Fluoro Detail, select High, Medium or Low.

Note 1: Depending on local regulations, the system may be configured such that the Fluoro Detail button also controls the fluoro dose. In that case, the button will be relabeled as Fluoro Dose. Please consult your local GE representative if you have any questions about how your system has been configured. The FLUORO DOSE selections will be as follows:

Low = 5 R/min, Low Detail
Medium = 5 R/min, Medium Detail
High = 10 R/min Medium Detail

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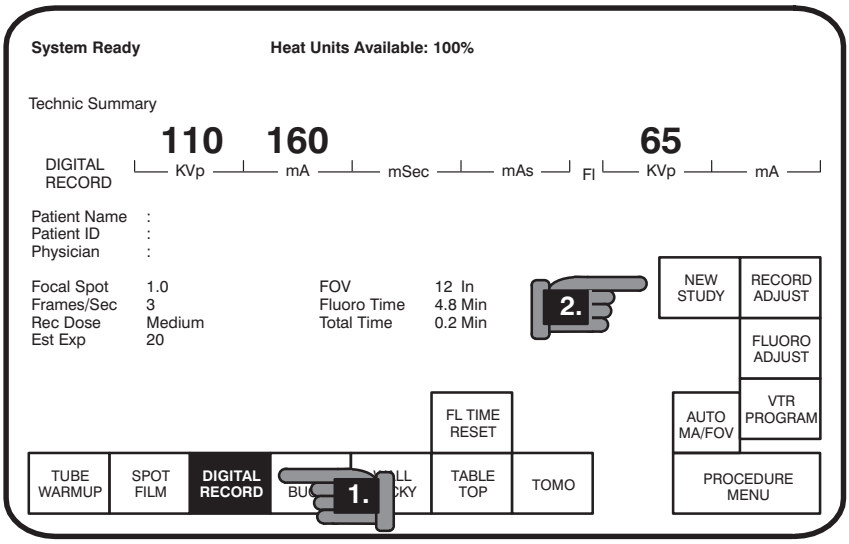
SECTION 6
TAKING DIGITAL RECORDER EXPOSURES

6–1 Record Exposures

Follow the steps below to set up Record technic parameters and capture Digital Record images.

ILLUSTRATION 6–1
DIGITAL RECORD TECHNIC SUMMARY SCREEN



DIGITAL RECORD

1. From any Technic Summary screen, touch **DIGITAL RECORD**. The Digital Record Technic Summary screen appears on the Console display.

NEW STUDY

2. At the Digital Record Technic Summary screen, touch **NEW STUDY**. The Record Annotate screen appears on the Console display.

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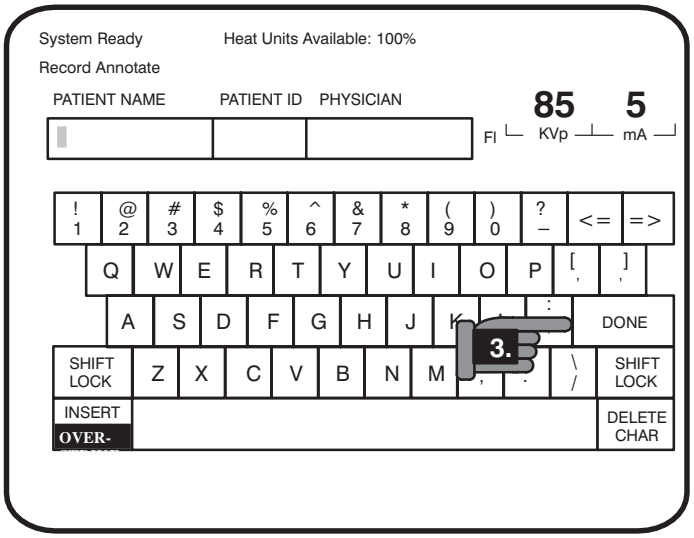
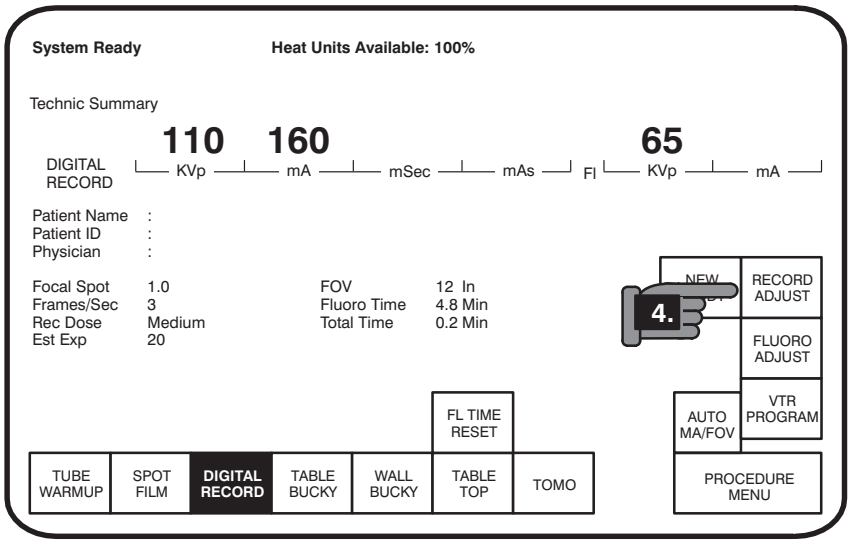
ILLUSTRATION 6–2
RECORD ANNOTATE



DONE

3. Use the Record Annotate "typewriter" keyboard to enter Patient name, Patient ID, and Physician data for the current study. Touch the **DONE** key to save the entries and return to the Digital Record Technic Summary screen.

ILLUSTRATION 6–3
TECHNIC SUMMARY SCREEN



RECORD ADJUST

4. At the Digital Record Technic Summary screen, review technique parameters. To make adjustments, touch **RECORD ADJUST**. The Record Technic Adjust screen appears on the Console display.

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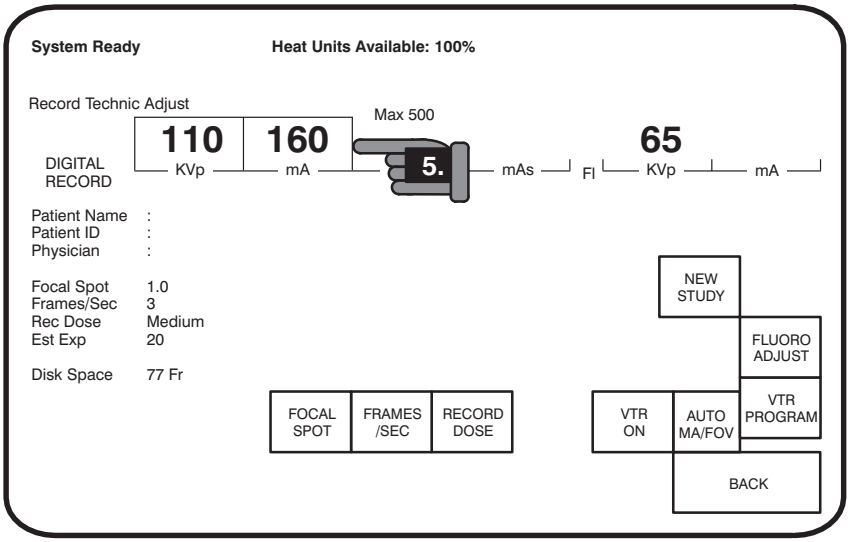
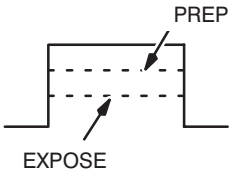
ILLUSTRATION 6–4
RECORD TECHNIC ADJUST



5. At the Record Technic Adjust screen, review technic parameters and adjust kVp, mA, and/or other parameters as necessary for the current study.

Note: **Due to regulations in the United Kingdom (UK), the console handswitch option is disabled for systems with Digital Record. Therefore, disregard the following handswitch instructions in UK regulated countries.**



6. Use the console handswitch or the Spot–Film Device PREP/EXPOSE bar to begin acquisition exposures. The console handswitch and the PREP/EXPOSE bar operate in two positions:

- PREP – first position (depressed to first position). System prepared for exposure.
- EXPOSE – second position (completely depressed). Initiates a Digital Record sequence.

For single exposures, press the console handswitch or PREP/EXPOSE bar to the second position. Release when the exposure is complete.

For multiple exposure runs, press and hold the console handswitch or PREP/EXPOSE bar down to the second position for the duration of exposure run.

7. For rapid digital record exposures, use the Integrated Fluoro and Expose Switch.

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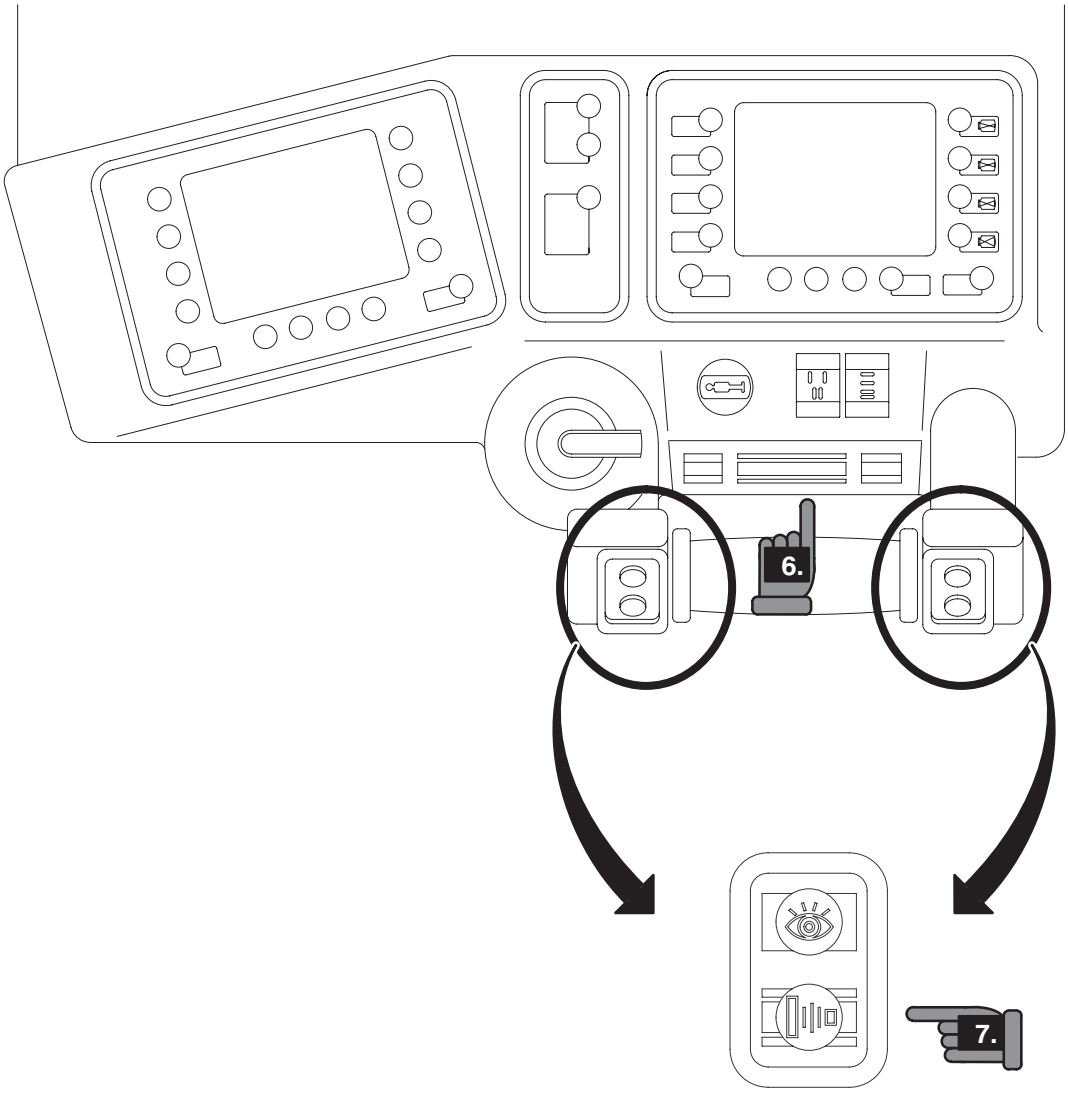
ILLUSTRATION 6–5
SPOT FILM DEVICE EXPOSURE CONTROLS



Note: For DR acquisition exposures, an exposure will continue until completion if the PREP/EXPOSE bar is let up from EXPOSE to PREP or released completely.

The Digital Recorder captures and stores up to 200 images per patient. When more than 200 images are necessary, enter a new study. A warning message is displayed on the Advantx Console, during prep, when remaining space is less than 15 frames.

8. Use the Digital Record console or remote control to review or process captured images as desired.

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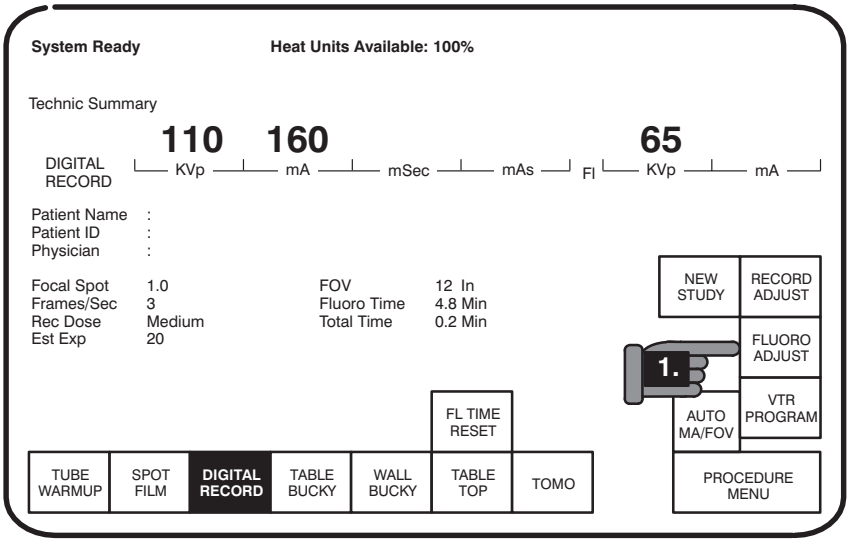
6–2 Fluoro Exposures

Follow the steps below to set up Fluoro technic parameters and view Digital Record images.

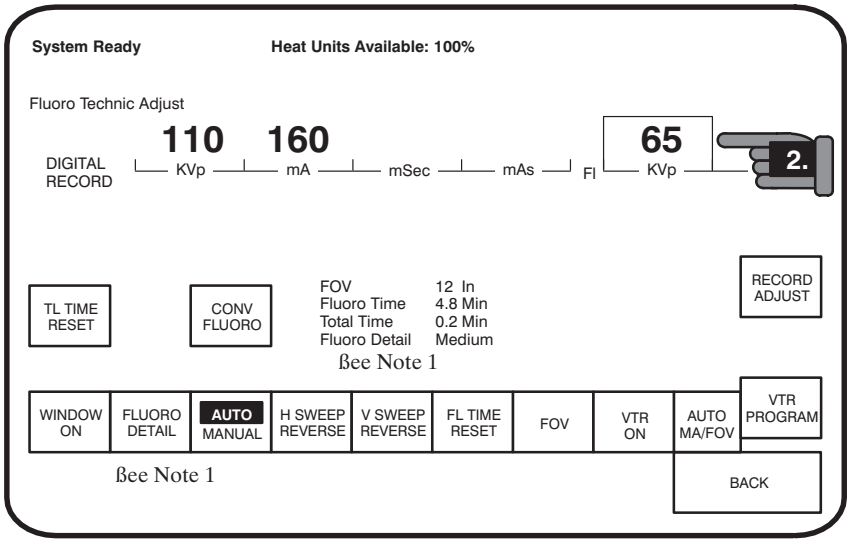
ILLUSTRATION 6–6
DIGITAL RECORD TECHNIC SUMMARY SCREEN



FLUORO ADJUST

1. At the Technic Summary screen, touch **FLUORO ADJUST**. The Fluoro Technic Adjust screen appears on the Console display.

ILLUSTRATION 6–7
FLUORO TECHNIC ADJUST



2. At the Fluoro Technic Adjust screen, review technic parameters and adjust kVp and/or other parameters as necessary for the current study.

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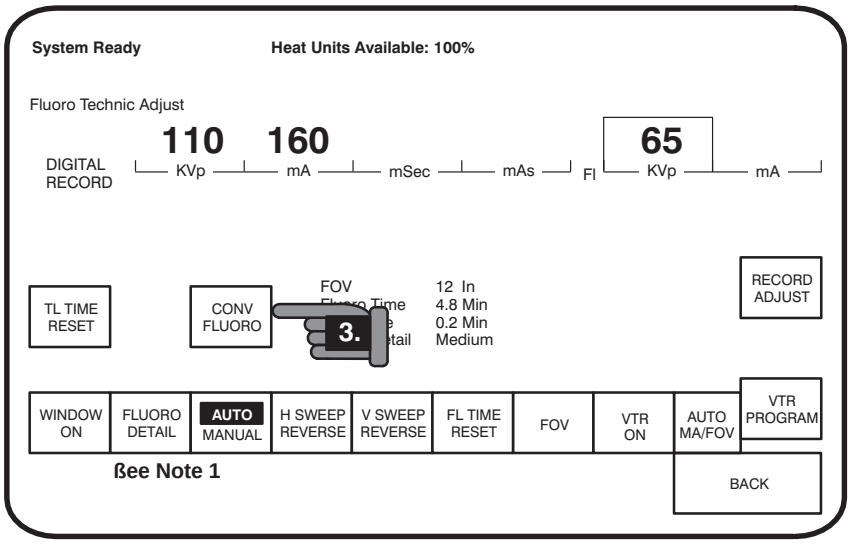
ILLUSTRATION 6–8
FLUORO TECHNIC ADJUST SCREEN



CONV FLUORO

IMAGE HOLD

3. Select the desired fluoro mode. The text of this selection will toggle between **IMAGE HOLD** and **CONV FLUORO**.

When **IMAGE HOLD** is displayed, digital fluoro is the current fluoro mode. Digital Record is possible and the last fluoro image is held and displayed on the TV monitor.

When **CONV FLUORO** is displayed, conventional (analog) fluoro is the current fluoro mode. Digital Record is possible, but there is no last image hold of the last fluoro image.

4. Step on the Fluoro Footswitch or press any of the Spot Film Console fluoro exposure buttons. The cassette moves from the X−Ray field, X−rays are generated, and fluoro images appear on the monitor.

Note 1: Depending on local regulations, the system may be configured such that the Fluoro Detail button also controls the fluoro dose. In that case, the button will be relabeled as Fluoro Dose. Please consult your local GE representative if you have any questions about how your system has been configured. The FLUORO DOSE selections will be as follows:

Low = 5 R/min, Low Detail
Medium = 5 R/min, Medium Detail
High = 10 R/min Medium Detail

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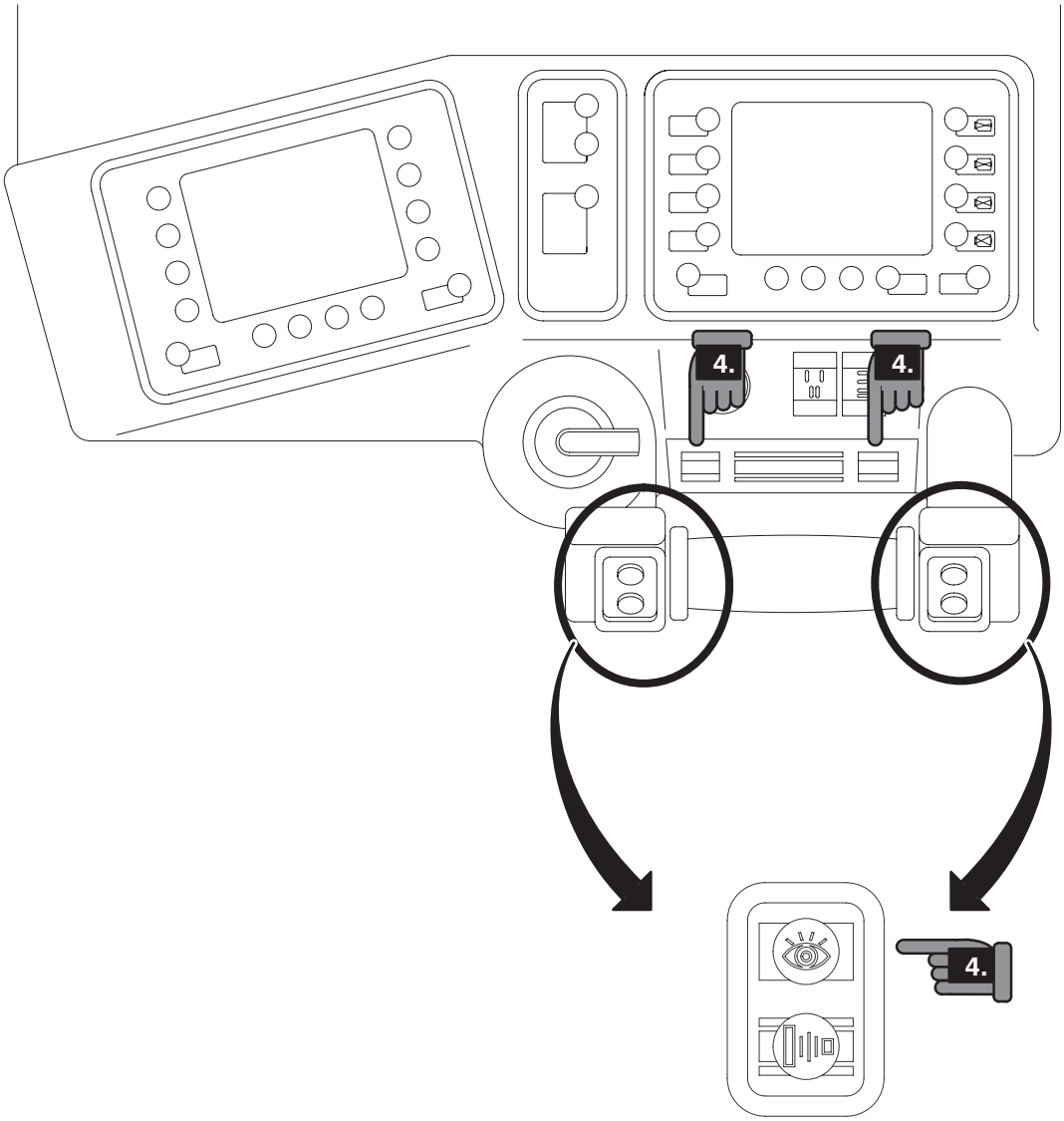
ILLUSTRATION 6–9
SPOT FILM DEVICE FLUORO CONTROL BUTTONS



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SECTION 7
AUTOMATIC EXPOSURE CONTROL OPERATION

The Automatic Exposure Control (AEC) will automatically terminate an x-ray exposure at a time which gives a pre-selected film density. It automatically compensates for changes in patient thickness, opacity, and different technic factors of mA, kVp, and SID.

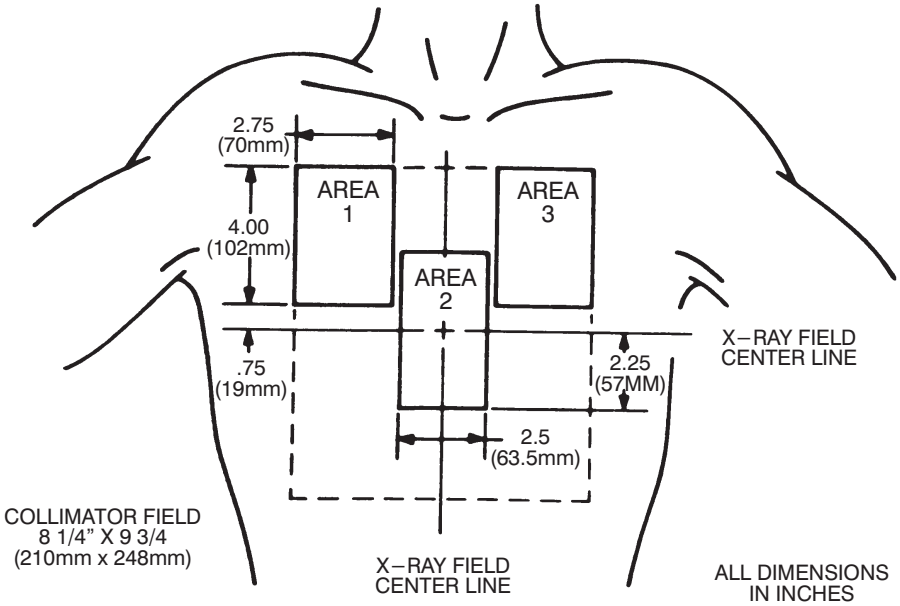
Proper patient positioning is very important in order to obtain precise exposures when using AEC.

- In extreme cases of misalignment, some radiation will bypass the patient, terminating the exposure prematurely and causing underexposed film.
- Conversely, if the heaviest patient area is positioned over the detector sensing area, other areas will be overexposed.

Become familiar with the size and location of the scanning aperture (area) of each detector. With such knowledge, you can develop proper positioning technics of each anatomical area and be able to duplicate such positioning for every patient. The radiographs will then be of uniform density irrespective of patient thickness or opacity.

7–1 Ion Chamber Detectors

ILLUSTRATION 7–1
POSITIONING OF ION CHAMBER DETECTORS



THE POSITION OF THE SENSING AREAS ARE SHOWN IN RELATION TO THE AREA OF A 8 1/4 X 9 3/4 (210mm x 248mm) COLLIMATOR LIGHT FIELD

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The Ion Chamber Detector is used with systems such as the RFX Table, the VRT Table, and the Vertical Bucky Stand.

- This detector has three sensing areas located as shown in Illustration 7−1.

  Sensing area Number 2 is at the center of the x-ray beam.

  Area Number 1 and Area Number 3 can be selected to cover an exposure of two symmetrical parts of the body at a time, such as the lungs or the kidneys.

  If this is the case, care should be taken to center the patient and detector areas accordingly.

7–2 Applications for Detector Areas

Applications for the detector areas are given in Table 7−1.

For example, one application for the ion chamber detector is chest radiography.

- In this application area 1 and area 3 must be located in line with radiation transmitted through the left and right lung fields, so that areas 1 and 3 are not influenced by variations in tissue opacity caused by the heart or vertebrae.

  If the patient is improperly positioned and the sensing areas are exposed to direct radiation, the phototimed exposures will be too short and the films underexposed.

  The opposite will be true if the patient's thoracic spine or sternum are positioned over the sensing areas.

- The basic positioning requirements are also important when using area 2. Misalignment may result in unusable film. Therefore, care should be taken when positioning the area of interest over area 2.

  1. Before positioning the patient, align the x-ray tube to the center of area 2.

  2. Collimate the light field to an area of 8-1/4″ × 9-3/4″ (210mm × 248mm). This light field is now centered on area 2 and encompasses two sides of areas 1 and 3. See Illustration 7−1.

  3. Position the patient's area of interest within the light field. Readjust the light field to the desired size. The detector sensing area is now aligned with the patient area of interest.

- When using area 2 only, a light field 2-1/2″ × 4-1/2″ (54mm × 114mm), if properly centered, will define that area and can be used to align a particular body portion with it. Refer to Illustration 7−1.

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TABLE 7–1
ION CHAMBER SENSING AREA APPLICATIONS

AREA(S) SELECTED	APPLICATION	PATIENT POSITIONING
No. 2 Only	To control exposure for an area of interest that is at the center of the x–ray field (**Note 1**).	Position the area of interest in the x–ray field center.
No. 1 Only	To control exposure for an area of interest that is in the upper left quadrant of the full sized radiograph (**Note 2**).	Position the area of interest in the upper left quadrant of the x–ray field.
No. 3 Only	To control exposure for an area of interest that is in the upper right quadrant of the full sized radiograph (**Note 2**).	Position the area of interest in the upper right quadrant of the x–ray field.
No. 1 and No. 3 together	To control exposure for two symmetrical parts of the body such as the lungs or kidneys (**Note 3**).	Position the areas of interest to be aligned with the No. 1 and No. 3 sensing areas (**Note 4**).
All areas together	To control exposure to allow the average density of the whole radiograph to approximate the the value of the preselected density.	Position the area of interest within the boundaries of the x–ray field.

Notes:

1. Area No. 2 must be selected by itself whenever the x–ray field is less than 10″ x 12″ (254 mm x 305 mm). This includes all film programs with a divided format (such as 2 on 1, 4 on 1, etc.) and whenever the collimator is operated to reduce the field size to less than 10″ x 10″ (254 mm x 254 mm).
2. Areas No. 1 and/or No. 3 are to be used with a full sized film of 10″ x 12″ (254 mm x 305 mm) or larger.
3. As area No. 2 is not selected for this application, the vertebral column should not affect the exposure, providing that the patient is correctly positioned.
4. If the Image Intensifier is used to verify the patient's position, note that sensing areas No. 1 and No. 3 are located in the upper left and upper right sectors of the TV image.

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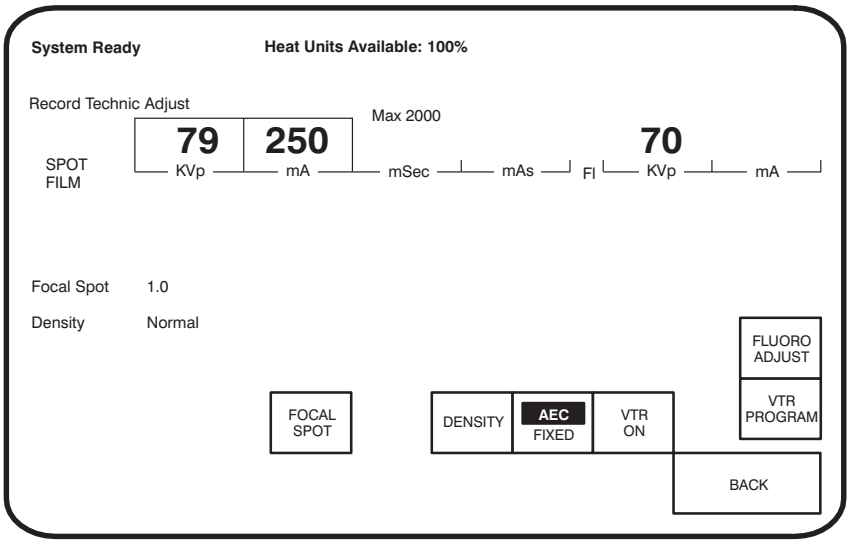
7–3 AEC Examples

7–3–1 Normal Exposures

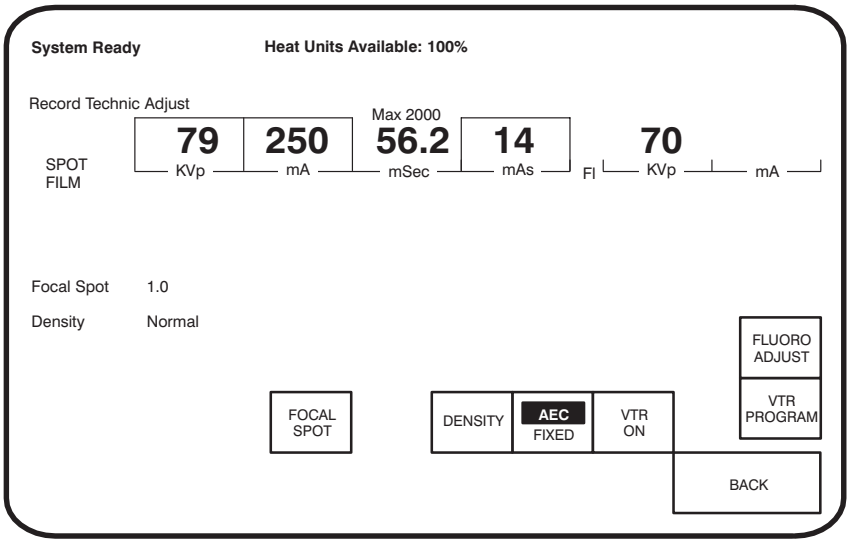
Illustration 7–2 shows an example of an Advantx system set up for an AEC exposure on Spot Film. For Automatic Exposure Control (AEC) mode, exposure time and mAs are not selectable, so these display fields are blank on the Advantx console.

ILLUSTRATION 7–2
AEC SETUP EXAMPLE (NORMAL OPERATION)



After the exposure has been completed in the AEC mode, the console will return with the values automatically displayed by the system for exposure time and mAs.

ILLUSTRATION 7–3
AEC EXPOSURE COMPLETED EXAMPLE (NORMAL OPERATION)



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The Advantx Applications Software sets two(2) limits for AEC operation:

1. mAs is limited to a maximum of 512 mAs
2. Exposure time is limited to 2 seconds (2000 milliseconds).

Note: When either one of the above limits is reached, the Applications software will terminate the exposure.

In Illustration 7−2, with a console selection of 250 mA, the system will reach the 2000 millisecond maximum exposure limit before it would reach the 512 mAs limit.

(the 250 mA console selection) X (2000 milliseconds) = 500 mAs

Therefore, the 2000 millisecond limit is reached before the 512 mAs limit.

Note: The Advantx Applications Software also uses a built−in formula to set limits for AEC operation in addition to the two limits stated above.

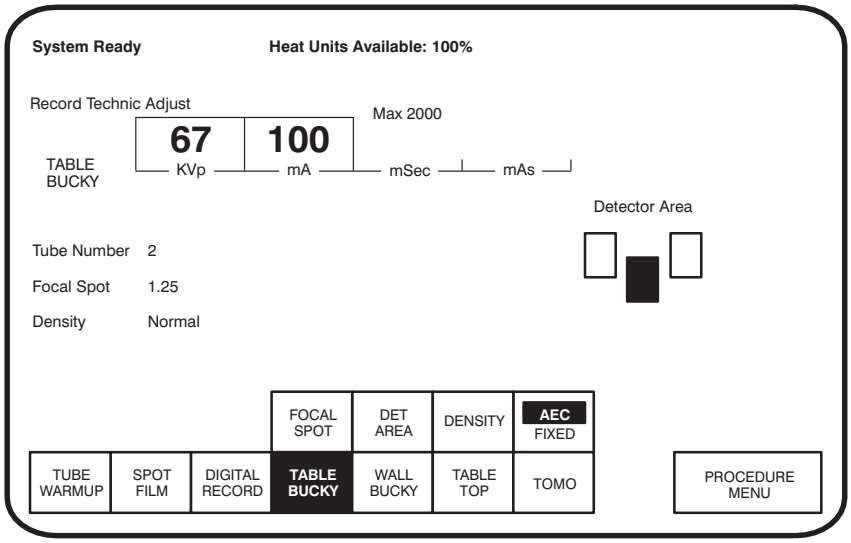
This formula will limit mAs to some value less than 512 mAs, and exposure time to some value less than 2000 msec, depending upon the technique selected.

In other words, due to this "formula limit" you may reach an AEC limit even with mAs less than 512 mAs and with exposure time less than 2000 msec, and the Applications software will terminate the exposure.

7−3−2 AEC Limit Console Message

Illustration 7−4 shows an example of an Advantx system set up for an AEC exposure, this time on a Table Bucky.

ILLUSTRATION 7−4
AEC SETUP EXAMPLE (SOFTWARE LIMIT EXAMPLE)



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Illustrations 7−5 and 7−6 show the Advantx and ISFD/IDD console screens with the message that is displayed when the system AEC backup time is reached. The backup time is calculated from the minimum of the following three conditions:

- A 2000 millisecond limit
- A 500 mAs limit or 512 mAs limit (based o the nearest Renard step)
- An X−ray tube protection “formula” limit

The operator must press the RESET button at either console to continue (based on an FDA requirement).

In a case such as this, the maximum exposure time reached may cause the film density to be lighter than desired. The operator may wish to change the mA selected to avoid reaching one of these limits in a subsequent exposure.

Note: When an AEC limit is reached while not in spot film mode, the RESET applies only to the Advantx console.

When an AEC limit is reached while in spot film series mode, the series acquisition is cancelled.

ILLUSTRATION 7–5
AEC SOFTWARE LIMIT ADVANTX-E CONSOLE SCREEN EXAMPLE

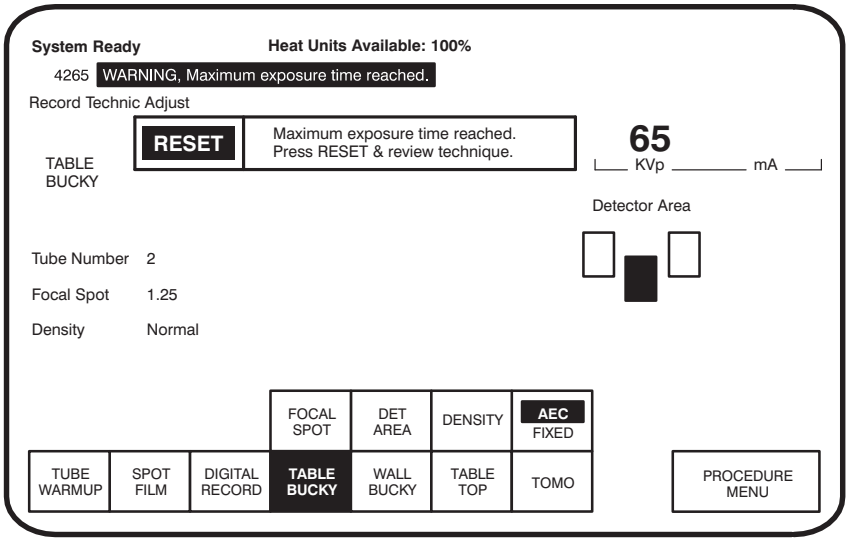

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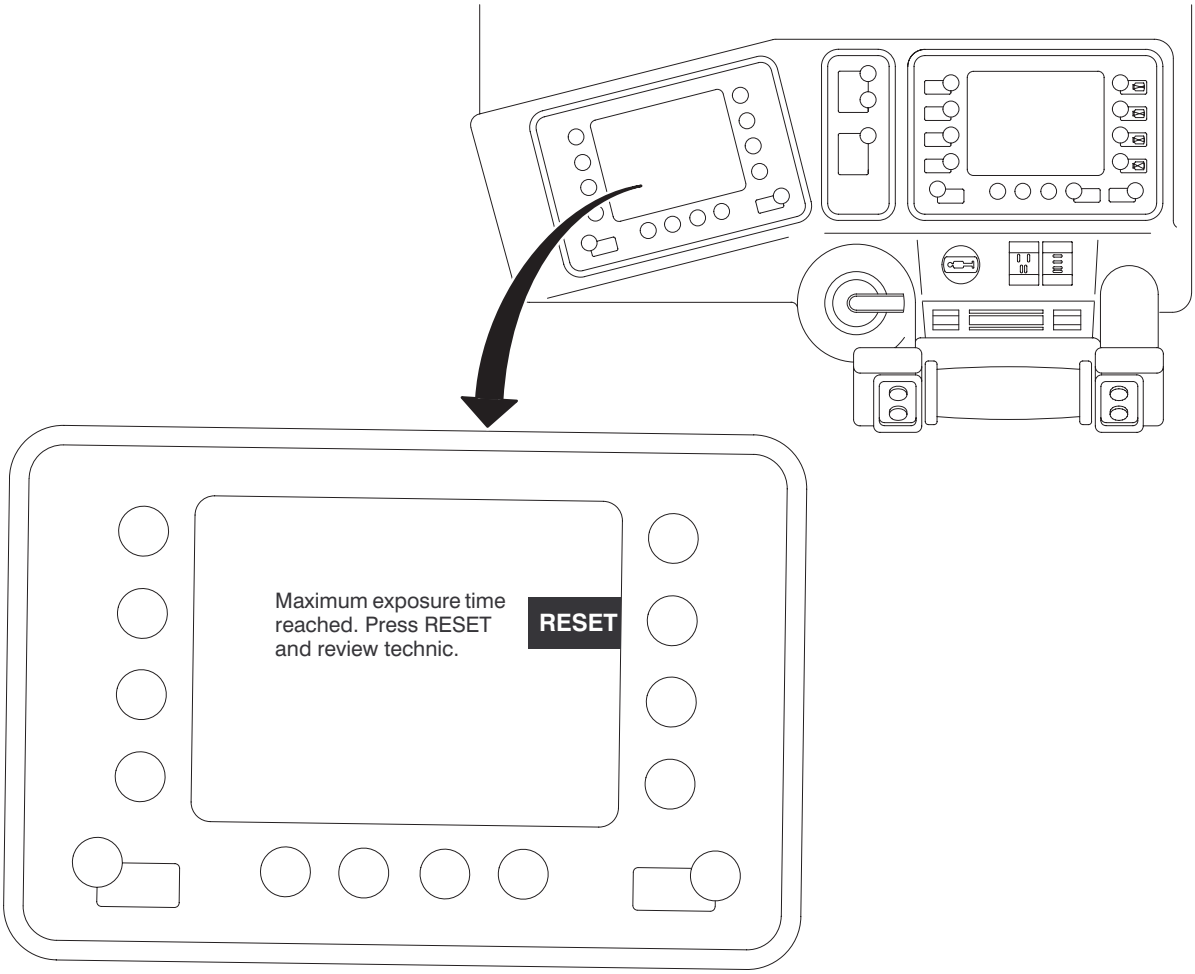
ILLUSTRATION 7–6
AEC SOFTWARE LIMIT ISFD/IDD SCREEN EXAMPLE (SPOT FILM MODE ONLY)



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7–3–3 512 mAs Limit

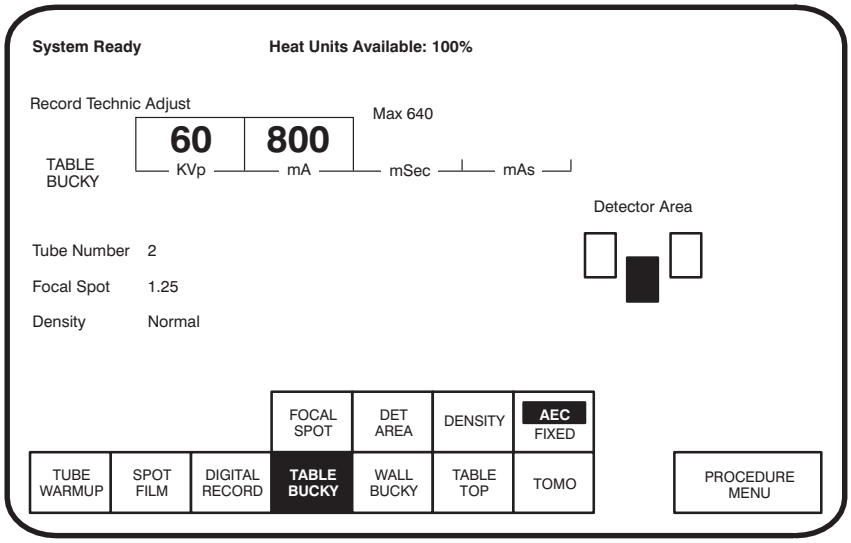
Illustration 7−7 shows another example of an Advantx system set up for an AEC exposure on a Table Bucky.

In this example, exposure time is limited by the Advantx Applications Software to a maximum of 640 msec (800 mA × 640 msec = 512 mAs)

In addition to the limits provided by the Applications Software, every Advantx system also has a maximum mAs limit for AEC operation.

The maximum mAs limit ensures that if an AEC exposure exceeds 512 mAs, the maximum mAs limit will terminate the exposure at less than 600 mAs.

ILLUSTRATION 7–7
AEC SETUP SCREEN EXAMPLE



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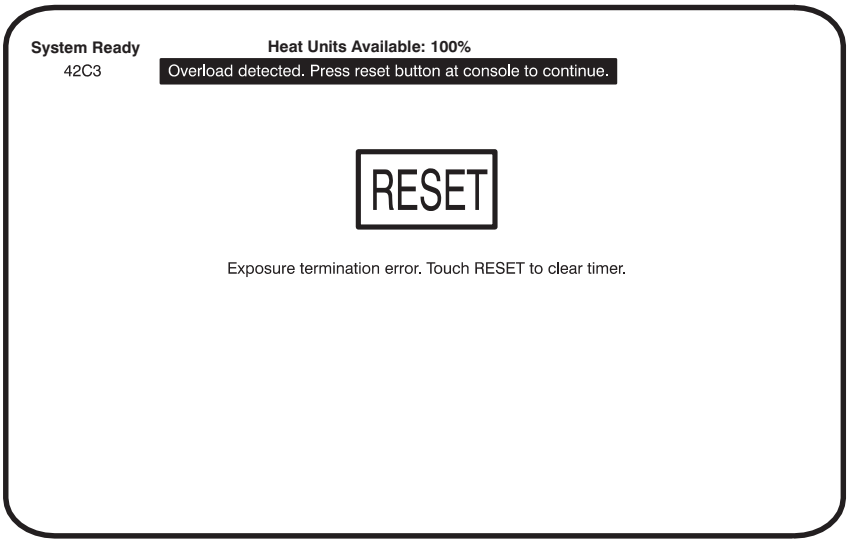
Whenever the maximum mAs integrator limit (550 mAs +/− 10 mAs) is reached during an AEC exposure, a Reset Screen will appear on the Advantx console. See Illustration 7−8.

Further exposures are inhibited until the system is reset. To continue, touch the RESET softkey on the screen.

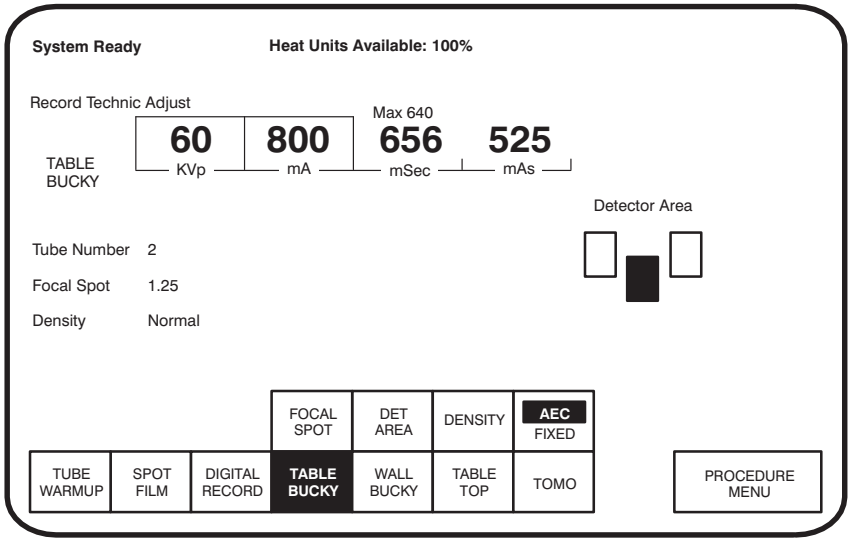
The regular occurrence of this screen may be evidence of a malfunction in your system. Call your Service Representative to assess the situation.

ILLUSTRATION 7–8
AEC RESET SCREEN EXAMPLE


System Ready
42C3
Heat Units Available: 100%
Overload detected. Press reset button at console to continue.
RESET
Exposure termination error. Touch RESET to clear timer.

After touching the RESET softkey, the original screen will appear with the msec and mAs fields filled in by the system. Illustration 7−9 shows 525 mAs, which is an additional indication that the maximum mAs limit was reached during the AEC exposure.

ILLUSTRATION 7–9
AEC AFTER–RESET SCREEN EXAMPLE



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SECTION 8
DRS IMAGE REPROCESS AND REVIEW

Note: To review digital images, **IMAGE HOLD** Fluoro must be selected on the Fluoro Technic Adjust screen. If conventional fluoro is selected, the system will not allow digital image review.

For DRS Systems, refer to the *DRS System Operator Manual* for complete operation information. The *DRS System Operator Manual* is furnished separate from the operation binder(s) used for the rest of the Operation Manuals.

Some of the image processing features are briefly highlighted below.

Cine Loop	A dynamic review of image record sequences.
Contrast,	One rotary knob for contrast adjustment.
Brightness,	One rotary knob for brightness adjustment.
Invert	One key for inversions, low levels white, high levels black.
Delete Image	Delete images from a study.
Delete Study	Delete the current highlighted study in the patient directory from the disk.
Digital Image Flips	Horizontal and/or vertical reverse image presentation.
Edge Filter	A post processing filter to enhance image detail and transition.
Film Image	Print images to a hard copy camera.
Fluoro Store	Store a fluoro image on disk. Either a real−time fluoro image or the Last Image Hold image.
Film Study	Print the selected images in a study as a “background” task.
Lo Edge, **Hi Edge**	Decrease filter strength. Increase filter strength.
Mask, **Subtract**	Real time subtraction for fluoro and record acquisition. Post processing subtraction for images in a study. This feature is optional.
Multiview	Provide a study overview in a 15−in−1 or 4−in−1 collage format.
Patient Directory	Display the list of patient studies stored on disk or select a patient study from the current displayed patient study list.

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Prior, Next	Display the previous or next image in a newly acquired or retrieved study.
Select	Tag images for film study.
Shutters	Apply a rectangular centered black mask on an image.
Zoom	Double the size of the region of interest on a image.
Copy	Copies image attributes to the next images.
Duplicate	Copies video to a second monitor.
Measure	Measure angles and lengths for quantitative analysis.

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SECTION 9
CONSOLE SCREEN SELECTION DESCRIPTIONS

This section lists the descriptions of the Advantx console screen selections in alphabetical order.

There are **two** ways to make a selection change. Either way, to start, touch the selection.

1. If the selection **stays** highlighted when touched, the change is made with the console rotary dial. (CW rotation increases the number value, CCW rotation lowers the number value.

Example: On the Fluoro Technic Adjust screen, touch the **FOV** selection. The selection stays highlighted. Rotate the console rotary dial CW to increase or CCW to decrease the size of the image intensifier field of view.

When the desired value is reached, touch the selection again to latch the selected value.

2. If the selection is highlighted only momentarily when touched, the change takes place immediately.

Example: On the Fluoro Technic Adjust screen, **FL Time Reset** is a momentary selection. Touch the **FL Time Reset**. It lights momentarily and automatically resets the fluoro exposure 5 minute timer.

Touch **AEC** or **Fixed** to change between the Automatic Exposure Control and Fixed mAs Screens.

Touching **Auto mA/FOV** allows the mA to change when the Field-of-View (FOV) is changed.

For example, when the FOV is decreased from 32 cm to 23 cm, the mA is increased by two mA stations. Conversely, if the FOV is increased from 23 cm to 32 cm, the mA is decreased by two mA stations.

Also, the Focal Spot will automatically change when either the maximum or minimum mA for the focal spot is reached. Bias focal spots do not change automatically.

The **Auto mA/FOV** feature is inoperative during fluoro exposures.

Note: The use of 105 kVp to increase the small focal spot during digital exposures may cause a problem by only allowing a 20 mSec backup time at 320 mA (the Auto MA/FOV function sets this technique automatically for specific FOV selections).

Avoid the use of 105 kVp when using Auto MA/FOV. It is suggested that you choose one of the following:

1. If small focal spot is desired for most exposures, change the 105 kVp to 100 kVp. This will keep the back up time at a minimum of 100 mSec.
2. If large focal spot is acceptable for digital exposures, change 105 kVp to 110 kVp.

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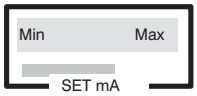
Touch the **Auto/Manual** selection to toggle back and forth between automatic mA control and manual mA control.

While in automatic mA control, the Advantx X−ray generator will automatically adjust the fluoro exposure to maintain the optimum TV monitor image as the anatomical area of interest is changed.

Manual mA control is set with the **Set mA** selection.



Touch **Set mA** and turn the console dial to manually set mA to the desired value.

The **Auto/Manual** selection must be in the manual position before manually changing mA.

Touch **BACK** to return to the Technic Summary screen.

This selection selects the desired fluoro mode:

When **CONV FLUORO** is displayed on this selection, conventional (analog) fluoro is the current fluoro mode. Fluoro exposure TV images are not digitized or recorded and there is no “last image hold” capability.

Touch **CONV FLUORO** to switch to Digital Record fluoro.

Note: Note that the text on this selection changes to **IMAGE HOLD**

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Touch **Density** and rotate the Console Dial to change the exposure density level when using the Automatic Exposure Control. Each single step increase will increase density by a factor of 1.25. Selections are −2, −1, N, +1, and +2. Select negative numbers for lighter radiographs and positive numbers for darker radiographs.

For example, going from step N to step +1 will increase the density by 25%:

$(\text{DENSITY}_{+1} = \text{DENSITY}_{N} \times 1.25)$.

Similarly, going from step +1 to step +2 will also increase the density by 25%:

$(\text{DENSITY}_{+2} = \text{DENSITY}_{+1} \times 1.25)$.

But going to a lower station will only decrease the density by 20%, that is, the next lower step will have a density of 80% of the previous step:

$(\text{DENSITY}_{-1} = \text{DENSITY}_{N} \div 1.25)$

which is the same as:

$(\text{DENSITY}_{-1} = \text{DENSITY}_{N} \times 0.80)$.

DET AREA

Touch **Det Area** and rotate the Console Dial to change the Ion Chamber Detector Area selection. Detector area selection displays are to the right and below the kVp, mA and mAs display.

Refer to Section 7, Automatic Exposure Control, for further information.

DIGITAL RECORD

Touch **DIGITAL RECORD** to select Digital Record as the image receptor.

FL TIME RESET

Touch **Fl Time Reset** to reset the fluoro exposure timer to 5 minutes. An alarm sounds when the timer requires resetting.

FLUORO ADJUST

Touch **FLUORO ADJUST** to move to the Fluoro Technic Adjust screen and set fluoroscopic parameters.

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FLUORO DETAIL

Touch **Fluoro Detail** and turn the console dial to select **High**, **Medium** or **Low** dose levels at the image intensifier.

Note:

Depending on local regulations, the system may be configured such that the Fluoro Detail button also controls the fluoro dose. In that case, the button will be relabeled as Fluoro Dose. Please consult your local GE representative if you have any questions about how your system has been configured. The FLUORO DOSE selections will be as follows:

Low = 5 R/min, Low Detail
Medium = 5 R/min, Medium Detail
High = 10 R/min Medium Detail

The **Auto/Manual** selection must be in the **Auto** position for the **Fluoro Detail** selection to appear.

High, **Medium**,and **low** refers to the level of photon quantity, activity, or dose, required **at the image intensifier input** to achieve a nominal image brightness.

Use **High** detail when fine detail is desired, e.g. small catheters.

Using **High** detail on very large patients is not recommended. The higher dose will quickly reach the the maximum legal 10 R per minute at table top and **not** enough photons will reach the image intensifier input for an acceptable image. The image will just go dark.

Using Low detail will allow more penetration on a larger patient, however, the image will have more noise.

The **Medium** level is a compromise selection between Low and High.

The **Fluoro Detail** selection and the *Fluoro Detail* selection display field are back lit during adjustment.

Touch **Fluoro Detail** again to deselect the feature.

FOCAL SPOT

Touch **Focal Spot** to toggle the focal spot selection between the large and the small focal spots. For X-Ray Tubes with more than two focal spots, touch this selection and rotate the console dial to change the focal spot selections.

The **Focal Spot** selection and display field are highlighted during adjustment.

FOV

Touch **FOV** and rotate the Console Dial to select the 16,12, 9, 6, or 4.5 inch image intensifier field of view sizes. The image intensifier field sizes available will vary depending on the system configuration.

FRAMES/ SEC

Select 1 to 6 Frames/Per Second. “Single” can also be selected to take a single Digital Record exposure.

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Touch the **H Sweep Reverse** to reverse the TV monitor display from right to left.

This is useful when a patient is put on the table in the prone position. With this condition, use **H Sweep Reverse** and the correct patient orientation will now be displayed on the TV monitor.

IMAGE HOLD

Selects the desired fluoro mode:

When **IMAGE HOLD** is displayed on this selection, digital fluoro is the current fluoro mode. Fluoro exposure TV images are digitized. The last image of a fluoro exposure is held and displayed on the monitor by the digital recorder.

Touch **IMAGE HOLD** to switch to conventional (analog) fluoro—note that the text on this selection changes to **CONV FLUORO** (see CONV FLUORO selection description).

NEW STUDY

Touch **NEW STUDY** to enter Patient name, Patient ID, and Physician data. Refer to Section 4−4, Record Annotate (New Study) Screen.

PROCEDURE MENU

Touch **Procedure Menu** to view the Procedure Select Menu screen's list of pre−programmed procedures. Refer to Section NO TAG − Procedure Select Menu screen and to the *Procedure Editing Manual* for more on this optional feature.

RECORD ADJUST

Touch **RECORD ADJUST** to to move to the Record Technic Adjust screen and set parameters for the selected recording image receptor.

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Touch **Record Dose** and rotate the console dial to select (highlighted) **High, Medium** or **Low** dose.

High, **Medium**,and **Low** refers to the level of X−ray photon quantity, activity, or dose, required **at the image intensifier input** to achieve a nominal image brightness.

Use **High** detail when fine detail is desired, e.g. small catheters.

Using **High** detail on very large patients is not recommended. When the maximum radiation level is reached at table top, the photon level reaching the image intensifier may not satisfy the **High** detail requirements for an acceptable image. The image will be dark.

Using Low detail, the image will have more noise, but when the maximum radiation level is reached at table top, the photon level reaching the image intensifier will satisfy the **Low** detail requirements for an acceptable image.

The **Medium** level is a compromise selection between Low and High.

Touch Record Dose button again to deselect (Not highlighted).

Touch **Spot Film** to select the Spot-Film device as the recording image receptor.

Touch **Table Bucky** to select the Table Bucky as the recording image receptor.

Touch **Table Top** to select the Table Top as the recording image receptor.

The Advantx System reports the total amount of fluoro time used for each case.

Touch **TL Time Reset** to reset the number for the next case**.**

Touch **Tomo** to select the Tomo−Link as the recording image receptor.

Touch **Tube Warmup** to select the tube warm up screen display. Refer to *Before You Start Operating* manual.

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Touch **V Sweep Reverse** to reverse the TV monitor display from top to bottom.

If a patient is put on the table in a prone position with his head at the foot of the table, both H and V sweep reverse should be selected.

VTR
ON

This selection appears if the system is equipped with a video tape recorder. Refer to Section NO TAG.

VTR
PROGRAM

Touch **VTR Program** to access the VTR Program screen. Refer to Section NO TAG – VTR Program – Play screen.

WALL
BUCKY

Touch **Wall Bucky** to select the Wall Bucky as the recording image receptor.

WINDOW
ON

Touch **Window On** to display the Advantx system's automatic brightness control area **(window)** on the TV Monitor during fluoro exposures.

The best system performance is usually obtained when the anatomical area of interest is centered within the automatic brightness control window.

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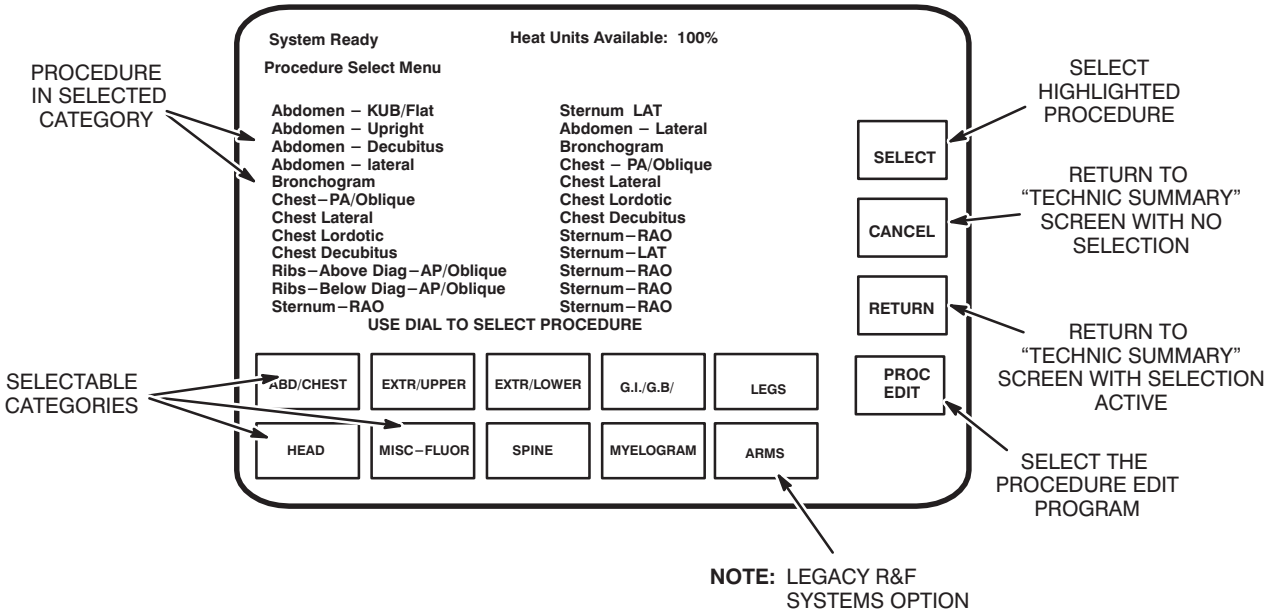
SECTION 10
PROCEDURE SELECT MENU

ILLUSTRATION 10–1
PROCEDURE SELECT MENU FUNCTIONS



The Procedure Select Menu Screen is a display of Record Technic and Fluoro Technic Adjust procedure screens, previously created and stored in memory, with parameters and selections typical for routine diagnostic procedures.

These Record Technic Adjust and Fluoro Technic Adjust screens screens **can be recalled** and modified individually as the need arises.

The Record Adjust and Fluoro Adjust screens are created and stored in the Advantx Computer memory using the the Procedure Edit program.

Up to **24** different screen procedures can be created and stored in each of **10** separate categories. Names can be included to reflect individually preferred X–ray techniques.

Note: **Legacy R&F Systems Option Only** – The first 10 procedures in this category can be displayed and each of the 10 procedures may be selected at the Spot-Film device. The APR option must be purchased to enable this option.

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10–1 Learning from a Radiographic & Fluoroscopic Example

To begin, touch **Procedure Menu** on the Technic Summary screen. The Procedure Select Menu will be displayed. At the bottom of the screen are ten main pre−programmed categories.

If Abdomen Chest category is selected from the main category. It is highlighted and a list of screen procedures appears on the screen. Up to 24 procedures can be programmed. To Select any procedure from the list turn the console dial until that item becomes highlighted.

Now the screen procedure is selected. Select Abdomen − Upright by turning the console dial until it is highlighted.

After selecting the screen procedure, make one of three choices: **Select**, **Cancel** or **Return**.

Touch **Select**, the highlighted procedure is displayed and the pre−programmed parameters and selections are automatically displayed for use.

Touch **Return**, to return to the Technic Summary menu and the screen procedure selected will be active.

Touch **Cancel**, to return to the Technic Summary screen without selecting a pre−programmed screen.

Touch **Proc Edit**, to select the Procedure Edit program to create and store new Record and Fluoro Technic Adjust procedures.

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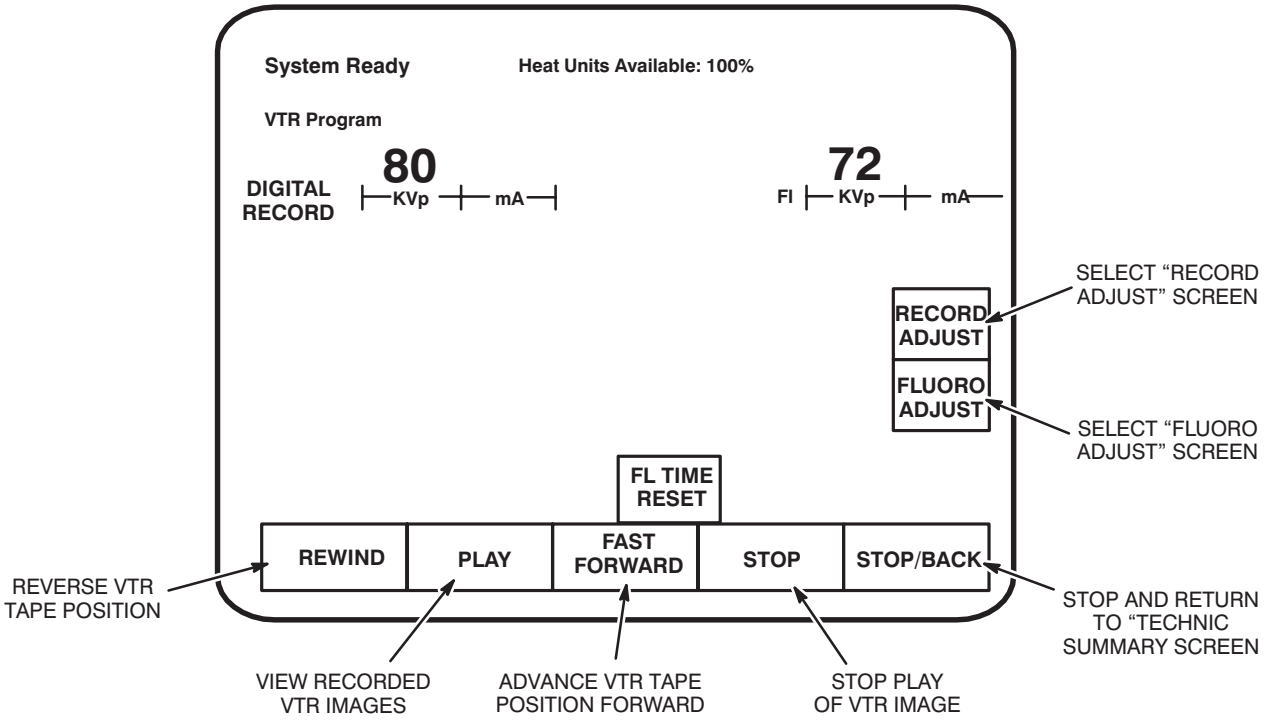
SECTION 11
VTR PROGRAM – PLAY SCREEN

11–1 VTR Program: "Generic" Tape Recorders (with Review)



The VTR Program controls the video tape playback features of "Generic" Tape Recorders (with Review).

To record VTR images during recorded imaging exposures:

- Touch the **VTR On** selection in the Record Technic Adjust screen.

To record VTR images during fluoro exposures:

- Touch the **VTR On** selection in the Fluoro Technic Adjust screen to record fluoro images.

In this VTR mode, use the four buttons on the Advantx console (Rewind, Play, Fast Forward, and Stop) to review previously recorded procedures.

Note: With these types of tape recorders, there is **no feedback** from the tape recorder to the console. This means that the Rewind, Fast Forward and Play buttons will stay on until touched again.

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11–2 VTR Program: "Generic" Tape Recorders (without Review)

To record VTR images during Film Record exposures:

- Touch the **VTR On** selection in the Record Technic Adjust screen.

To record VTR images during fluoro exposures:

- Touch the **VTR On** selection in the Fluoro Technic Adjust screen to record fluoro images.
- Touch the **VTR On** selections in both the Fluoro and Record Adjust screens to record both fluoro and film record images onto video tape.

There are no selections on the Advantx console for control of video cassette recorder operation. The video cassette recorder is controlled and operated using the video cassette recorder local or remote keypad.

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SECTION 12
CHANGING THE DRS SYSTEM CLOCK

To Change the DRS System clock time:

1. Turn the Advantx System on from the Advantx Console.
2. At the Fluoro Technic Adjust screen, select Image Hold Fluoro.

At the DRS remote control console:

1. Press the Patient Directory Button. The Patient list will be displayed on the TV monitor.
2. Select the USER menu.
3. Press the down arrow until the time field is selected.
4. Press SELECT to enter the edit mode.
5. Enter the correct time.
6. Press SELECT to exit the edit mode.
7. Press Patient Directory to exit USER menu.

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GE Medical Systems

GE Medical Systems: Telex 3797371
P.O. Box 414, Milwaukee, Wisconsin 53201 U.S.A.
(Asia, Pacific, Latin America, North America)

GE Medical Systems — Europe: Telex 698626
283, rue de la Miniére, B.P. 34, 78533 Buc Cedex
France

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